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OUTLINES OF PSYCHOLOGY

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PREFACE TO NEW EDITION.

In this new edition I have endeavoured to make the *Outlines of Psychology* a more complete introduction to the science. The publication of a work specially designed for the educator (*The Teacher's Handbook of Psychology*) has enabled me to omit the sections dealing with the applications of psychology to the technical work of the teacher. At the same time I have endeavoured to retain something of the practical element of the earlier editions. The order of exposition has been altered so as to bring it into line with my recently published treatise, *The Human Mind*. A few drawings have been added, which may, I trust, be found useful to the student.

I am greatly indebted to Mr. S. Alexander, of Lincoln College, Oxford, and to Mr. J. Armitage Smith, of the Birkbeck Institute, both of whom have kindly read through proof-sheets of the volume, and suggested valuable emendations.

HAMPSTEAD, *October*, 1892.

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PART I.

INTRODUCTORY.

CHAPTER I

SCOPE AND METHOD OF PSYCHOLOGY.

Definition of Psychology. The term Psychology (from ψυχή, soul, and λόγος, reasoned account) marks off that department of scientific knowledge which has Mind for its subject-matter. It follows that in order to have a clear apprehension of the subject we must set out with a provisional definition of the word mind.

We are all accustomed to talk about minds. We attribute a mind to ourselves, to other persons, and even to many of the lower animals. It is these minds, or rather their common elements, processes or phases, which form the subject-matter of psychology. More particularly it is the higher type of mind as it appears in man that has to be considered by the psychologist.

We distinguish between a mind as a unity, the *I* that thinks, desires, and so forth, and its particular and changing phenomena or states, as thoughts, desires. What the mind is in itself as a substance is a question that lies outside psychology, and belongs to that province of knowledge known as philosophy or metaphysic. As a science psychology is concerned only with the particular manifestations or phenomena of mind, with the psychical processes

or 'psychoses' (as they are now called) which are accessible to observation.

The question as to what mind is in itself or as a substance is a metaphysical one, and the solution of it does not seem necessary to psychology, and can best be taken up after the study of the phenomena of mind. No doubt our common ways of speaking about mental processes, *e.g.*, 'I think,' 'my mind recalls,' suggest the idea of a mental unity which holds together and combines the several states which we call psychical phenomena. And it may be said that the language of scientific psychology, such as 'state of mind,' 'the mind's activity,' necessarily implies this idea. Yet the examination of the meaning of this idea does not seem necessary to a scientific treatment of the phenomena of mind.

How, it may be asked, are we to mark off these psychical phenomena or states from other facts? We cannot, it is evident, define such phenomena by resolving them into something simpler; for they have nothing in common beyond the fact of being mental states. Hence we can only use some equivalent phrase, as when we say that a mental phenomenon is an element or ingredient of our conscious life or conscious experience, or a state of our consciousness. Or again we may enumerate the chief phases or varieties of manifestation of mind and define it as that which thinks or knows, feels pleasure and pain, and wills.[1]

Finally, we may set mind in antithesis to what is not mind. Mind is non-material, *i.e.*, wanting in the properties of material things, as weight, and, further, has no existence in space as material bodies have. We cannot weigh a thought or a feeling, and one feeling does not lie outside another in space: these phenomena occur in time only. Mind is thus marked off as the region of the 'unextended'. It is sometimes spoken of as the internal smaller world (microcosm) in contradistinction to the external and larger world (macrocosm); but this language, which

[1] It is to be noted that popular language is apt to restrict the term mind to the intellectual aspect, knowing or intelligence. In popular every-day psychology other terms, as 'heart,' 'character,' 'soul,' are applied to other aspects.

is highly figurative, does not mean that mind is a region of space enclosed by what we call the "external" world.[1]

While it is important thus to set mind in sharp contrast to material things, it is hardly less important to keep in view the close connexion between the two. What we call a human being is made up of a bodily organism and a mind. Our personality or 'self' is a mind connected with or embodied in a material framework. More particularly our mental processes are connected with the actions of that group of physiological organs known as the nervous system. It is fairly certain that the most abstract thought is accompanied by some mode of activity in the brain-centres. Hence while we must be careful not to confuse the mental and the material, the psychical and the physical, as though they were of the same kind (homogeneous), we cannot wholly exclude the latter from view in dealing with mind. Psychology may thus be said to have as its aim *the scientific study first of psychical phenomena themselves, and secondly, as subsidiary and complementary to this, of the connexions of these with physical, and more particularly nervous, operations.*

How We Come to Know Mind: (*a*) Subjective Observation. There are two distinct avenues by which we acquire knowledge of mind. The first is the direct, internal, or subjective way.[2] In following this we direct attention to a process in our own mind at the time of its occurrence, or immediately afterwards. All of us have some power of turning the attention inwards on the successive movements or changes of our mental life. Thus we can attend to our emotions of joy and sorrow, love and hate, to our desires and motives, and so on, with a view to observe their

[1] The meaning of the antithesis, external and internal, will be best considered when we take up the subject of sense-perception.

[2] 'Subject' stands in a relation of opposition to 'object'. The former refers to the conscious mind which knows something, or is affected (pleasurably or painfully) by a thing; the latter marks off that which is known, or which affects the mind in a certain way. The house I see, the flower I admire, are objects to me; while I am the subject which sees and admires these objects.

nature, composition, the manner in which they are affected by the circumstances of the moment, and so forth; and this internal observation of mind can be indefinitely improved by exercise, and rendered exact and scientific. This scientific form of internal observation is known as Introspection ('looking within').

(*b*) **External or Objective Study of Mind.** In the second place we may study mental phenomena not only in our own individual mind but as they present themselves externally in others. This is the indirect, external, or objective way of studying mental phenomena. We all employ this way when we note the manifestations of others' feelings in looks and gestures; arrive at a knowledge of their thoughts by their speech, or observe their inclinations and motives by noting their actions; and scientific knowledge of mind is partly gained by widening and rendering more exact this exterior observation.

Such objective observation embraces not only the mental phenomena of the individuals who are personally known to us, old and young, but those of others of whom we hear or read, especially of great minds and of all exceptional varieties. Also it includes the study of the collective mind, more particularly as it expresses itself in primitive and simple societies, in early forms of language, belief, and so forth. It includes too a *comparative* study of mind, or the observation of points of agreement and difference among its various manifestations in different races, and even in different grades of animal life. The study of the simpler phases of mind in the child, in backward and uncivilised races, and (so far as this is possible) in the lower animals, is especially valuable for understanding the growth of the mature or fully-developed human mind.

Finally, this objective observation of mind, when carried out fully, includes the study of mental phenomena in connexion with their physiological conditions; *viz.*, nervous processes. All external observation of mental phenomena takes place by noting some of their bodily accompaniments, such as facial expression, and the actions of speech. Here, however, we regard the bodily movement as the outcome or manifestation of the inner mental state. In addition to this, psychology considers the actions of

the nervous system as *conditioning*[1] mental activity, that is, as underlying and determining it in various ways.

Combination of Internal and External Observation. Scientific knowledge is characterised by certainty, exactness, and generality. We must observe carefully so as to make sure of our facts, and to note precisely what is present. And we must go on from a knowledge of the particular to a knowledge of the general. From this we may easily see that neither the internal nor the external source of information is sufficient without the other for giving us a *science* of mind. To begin with, since we have no direct or immediate knowledge of any mental state, save as it presents itself in our own individual mind, some amount of introspection is the first condition of all certain and accurate knowledge of mind. To try to discover mental phenomena and their laws merely by watching the outward manifestation of others' thoughts, feelings and volitions, would plainly be futile. For these external manifestations are in themselves as empty of meaning as words in an unknown tongue, and only receive their meaning by a reference to what we ourselves have thought and felt. On the other hand, an exclusive attention to the contents of our individual mind would never give us a *general* knowledge of mind. In order to eliminate the effects of individuality we must at every step compare our own modes of thinking and feeling with those of other minds; and the wider the area included in our comparison, the sounder are our generalisations likely to be.

Each of these ways of studying mind has its characteristic difficulties. To attend closely to the events of our mental life presupposes a certain power of 'abstraction'. It requires at first a considerable effort to withdraw the attention from the more palpable and striking impressions of sense which constitute the phenomena of the external world, and to keep it fixed on such shadowy, ever-shifting phenomena as the ideas, the senti-

[1] A condition is any circumstance necessary to the production of a phenomenon All the conditions of a phenomenon taken together constitute its cause. To condition is thus to have a part in causing or producing a result.

ments of our inner world. Even in the case of the trained psychologist, the work is always attended with peculiar difficulties

On the other hand, there is a characteristic danger in reading the minds of others which arises from an excessive propensity to project our own modes of thinking and feeling into them. This danger increases with the remoteness of the mind we are observing from our own. To apprehend, for example, the sentiments and convictions of an ancient Roman, of a Hindoo, or of an uncivilised African, is a very delicate operation. It implies close attention to the differences as well as the similarities of external manifestation, also an effort of *imagination* by which, though starting from some remembered experiences of our own, we feel our way into a new set of circumstances, new experiences, and a new set of mental habits. Children, again, owing to their remoteness from adults, are proverbially liable to be misunderstood; and, lastly, the mental life of the lower animals, differing still more widely from our own, is much less susceptible of certain and accurate interpretation.[1]

General Knowledge of Mind. Every science consists of generalised knowledge, or knowledge thrown into the form of general propositions; and mental science seeks to generalise its own department of knowledge. This it does, in the first place, by arranging the observed phenomena of mind under certain heads. That is to say, it classifies the wide variety of mental states according to their resemblances. In so doing it overlooks the points of difference, both between one mind and another, and between the several states of one and the same mind, and fastens attention on points of similarity, or common features.

In close connexion with this classification of mental states, mental science aims at establishing general truths or laws of mind. Since thoughts, feelings, and other phenomena of mind are processes or events in time, psychological laws have to do in a special manner with the relations of sequence and of causal

[1] On the errors incident to Introspection and the interpretation of other minds, see my work on *Illusions*, chaps. viii. and ix.

dependence among mental states. That is to say, the ultimate object of our science is to determine the conditions on which mental phenomena depend.

Now a little attention to the subject will show that our mental states are related in the way of dependence not only to other states immediately preceding, but to remotely antecedent phenomena. For example, the quick response of a soldier to a command depends on the formation of a habit, which process may have been going on for many years. In this way the consideration of relations of dependence among mental states naturally leads on to the view of mind as a process of growth or development. The ultimate problem of psychology is, indeed, to explain all the higher and more complex mental states as products of development. Hence the most important class of laws for the psychologist are the laws of mental development.

Psychological Method: Analysis. In thus seeking to classify its phenomena, discover their general laws, and by help of these laws to account for its phenomena, psychology is following the same logical method as the other sciences. It is by the operations of Classification and Induction, supplemented by Deduction, that the physical sciences have constituted themselves into organic bodies of knowledge.

It has been pointed out that in psychology we have to set out with the states of our own mind, as the phenomena most accessible to observation. Now these processes are evidently highly complex. It follows that psychological investigation proceeds by a resolution of the complex phenomena of mind into simple ingredients or constituent factors. This is known as Psychological Analysis. To analyse a mental product is to take it apart in our thoughts, viewing by separate acts of attention its several component factors, elements or aspects.[1] Thus in the case of a complex motive, such as the pursuit of wealth, we may distinguish

[1] This logical analysis or separation in thought must be carefully distinguished from that actual separation of parts which takes place in chemical analysis

its several ingredients, as love of material comfort, love of display, and enjoyment of power. It is by such mental or ideal separation of the complexes of our mental experience that we must seek to find our way back to the earlier and simpler forms of mental life. Thus by analysis we can resolve a feeling of attachment to a person or a place into a *growth* out of many past pleasurable experiences. This analytical resolution of psychical phenomena into their constituent factors is beset with peculiar difficulties which constitute one of the principal obstacles to introspective observation.

This work of psychological analysis leads on to classification and induction. It is by resolving our concrete mental experiences into their constituent elements that we are able to classify them under particular heads or aspects. Thus, it is by specially considering the element or phase of pleasurable feeling in the experience of surmounting a difficulty that we are in a position to class it with other varieties of pleasurable feeling. In like manner it is by analysing the complex and tangled processes of our mental life that we find our way inductively to those uniform modes of combination or production which we formulate in our general laws.

It is important to add that this introspective analysis of our complex mental states and detection of their laws is aided by the objective observation of other and simpler forms of mind. Unless we could observe in children and the lower animals the simpler forms of our mental processes, we should be unable to trace back the complexities of adult consciousness to their constituent elements, and even with this help, we can only carry such analytical simplification of psychical phenomena to a certain degree of completeness.

Psychological Synthesis—The Genetic Method. Having thus by analysis and the closely connected process of induction reached the simplest attainable forms of our mental life and certain laws of combination, we supplement analytical inquiry by a synthetic reconstruction of the process of mental formation or development. That is to say, we attempt to deduce the

higher and later forms of the mental life from the earlier. The systematic carrying out of this method of tracing out the process of psychical formation is known as the Genetic method. We employ this method when starting with the sensations of touch, sight, and so forth, we trace out the growth or formation of our every-day perceptions and ideas of external objects.

Experiment in Psychology. It has been commonly assumed that psychology is a science of pure observation, and cannot share in the advantages of experiment, or that active control of the phenomena to be studied which has so greatly promoted the advance of the experimental sciences. Recently, however, experiment has been introduced into certain departments of psychological inquiry. Such experiments may be carried out introspectively upon one's own mind, as in running one's eye down a column of names, and noting carefully the associated idea which is first called up in each case. The more important psychological experiments, however, have been carried out by means of external control, as when a person presents a number of words in order and asks the subject of the experiment to record the suggestion first occurring. These experiments have already proved of real service in helping us to determine more precisely the nature of our mental processes, and the way in which the several constituents are related one to another.

The Psychical in its connexion with the Physical: Physiological Psychology. Though psychology is primarily concerned only with the psychical, it must, in order to give an account of mental states in their concrete completeness with all their determining conditions, take note of the related physical processes. More particularly the psychologist has to view mental processes as accompanied and conditioned by those processes in the bodily organism which constitute the functional actions of the nervous system. To determine these relations is the special purpose of what is now known as Physiological Psychology This department of inquiry, as its name suggests, involves at once a careful physiological study of nervous processes, and also an equally careful psychological observation and analysis of

the accompanying mental processes. This department of Physiological Psychology has been particularly successful in elucidating the more elementary processes of mind, sensation, and conscious movement.

It is through a careful and exact study of the correlations of psychical process and nervous action that the range of experiment in psychology has mainly been enlarged. Indeed, the possibility of applying the experimental test to psychical phenomena is put forward as one of the great advantages of this conjoint or concurrent study of the psychical and the physical. The first direction of this experimental inquiry was into the relations of *quantity* between the elementary phenomena of sensation and the connected nervous processes. Thus it was asked how much light-stimulus must act on the eye before a sensation of light is produced. This line of inquiry is sometimes specially marked off as 'Psycho-physics'.[1]

Mind and its Environment: Social Conditions. The activity of the nervous system is related to the events taking place in the environment of the organism in our common external world. It is by the action of external forces or stimuli (light, sound, etc.) that the organs of the system are first excited to their functional activity. On the other hand, the outcome of this functional activity is a reaction of the organism on its environment in the shape of a muscular action or movement, which serves to modify external arrangements in some way, or at least its own relations to the environment, *e.g.*, in all actions tending to self-preservation. Hence the psychologist, in including nervous conditions in his view of mind, is necessarily led on to a consideration of the relations of the organism to the environment. Thus he has to make reference to the stimuli (light, etc.) acting on the organs of sense.

[1] Fechner used the terms psycho-physic, psycho-physical, with reference to the relation of the psychical element, sensation, to the *external* physical agent or 'stimulus,' *e g.*, light ; but of late the term psycho-physical has come to refer to the correlation of the psychical phenomenon with the *nervous* process.

Among these relations of the organism to its surroundings there is one group which requires special recognition in any complete attempt to trace the processes of formation going on in the individual mind. These relations are commonly known as those of the individual to the community or the social environment. It is true the action of the family, and of the wider community, on the individual, and the reciprocal action of the individual on this, take place through the same media, *viz.*, impressions of the senses, muscular actions, through which he is brought into relation to natural objects; yet the interaction in the case of the social environment is of a peculiar kind. It is marked off as *moral* influence, and works through the agencies which bind man to man, such as imitation, sympathy, and which constitute what we call sociality.

Unlike the reference to physiological conditions, the reference to sociological becomes more important as we advance from the elementary parts of our mental life to its complex forms. More particularly it is in dealing with the higher processes of thought, conditioned by our common language, as well as the more complex forms of feeling and action (*e.g.*, æsthetic and moral sentiments, right conduct), that the necessity of reference to the social surroundings becomes most distinct.

Relation of Psychology to Other Sciences. Psychology may, in the first place, be classed along with the special sciences. Like chemistry or physiology, it studies a particular group of phenomena and the laws of these. Its place among the special sciences is determined by the circumstance that it studies a certain group of properties found in a portion of living things. As we have seen, it stands in a peculiar relation to physiology. We may arrange the sciences in a series, beginning with the most abstract, or those which deal with the most universal properties of things, and ending with the most concrete, or those which treat of the most special or circumscribed group of properties. We thus have an order as follows: Mathematics, Physics, Chemistry, Biology (Physiology, etc.), Psychology, and Sociology. In this arrangement each group of things studied has the properties of

the previous groups, and special additional properti chemical bodies have quantity, mechanical prop special chemical properties besides. According to th ment, psychology marks the introduction of those highly distinctive properties which constitute mind or activity.

Looked at from another point of view, however, psy not to be classed with the special sciences, but occupie place outside and above these. All science is knowled knowledge implies a mind or minds to know. He special science on its subjective or 'mind' side, *i.e., as for my own or somebody else's mind*, becomes a part of th matter of psychology.

Viewed on this side, psychology comes into close with a department of thought very different from th special senses, *viz.*, Philosophy or Theory of Knowle deals with the nature of knowledge in general. Yet difference between the two. Psychology confines its study of knowledge on its subjective side as a process of going on in minds. It does not inquire into the objec or validity of the cognition. This, however, is just wh sophy has to take up and determine.

Psychology and Practical Science. Psycho theoretic or speculative as distinguished from a practic or art. A theoretic science concerns itself about thing are, how they actually happen or come to pass; a science or art concerns itself with things as they ough or as we wish them to be. It defines the end of som ment of practice, and supplies us with rules for the attai this end. Practical science, though thus contrasted with is really very closely connected with it. In order to be gaining any end, we must have full and exact knowled agencies we employ. Thus a sculptor must know so about the properties of clay and marble, a physician so about the functions of the body, and so on.

Viewed in this way, psychology forms the basis of a

of practical sciences. All the practical disciplines, indeed, which aim at guiding or influencing thoughts, feelings, or actions, have their footing in psychology. These relations of psychology to practical science may be roughly set forth as follows:—

(A) Psychology constitutes, in the first place, the immediate basis of those regulative sciences which determine the ends of mental activity, and supply rules or laws for the proper regulation of this activity with a view to these ends. It thus underlies the whole comprehensive art of living, or of self-culture.

As we shall see presently, there are three main varieties of mental activity, or mental function, *viz.*, Cognition, Feeling, and Volition. The due regulation of each of these so as to bring it to its most perfect form of realisation falls to a special regulative science. Thus we have:—

(1) Logic, or the regulation of thought or the reasoning processes, with a view to the realisation of the end of truth.
(2) Æsthetics, or the regulation of the feelings, with a view to the appreciation and realisation of beauty.
(3) Ethics, or the regulation of voluntary action or conduct, with a view to the realisation of the end of virtue, or the morally good.

(B) In the second place, psychology forms the groundwork of those practical sciences or arts which aim at influencing the minds of others in various ways. Of these the most comprehensive and important is Education, inasmuch as it aims at acting upon, developing, and controlling the mind as a whole (Intellectual, Æsthetic, and Moral Education).

(C) Lastly, psychology supplies principles to a number of practical sciences or arts which aim at more special and circumscribed effects. Thus it underlies the whole art of politics, or the art of governing men in masses or communities, and in close connexion with this the art of rhetoric or persuasion through

oratory. In like manner it forms the theoretic base of the several Fine Arts, including Literature, each of which aims at producing a certain variety of that mental effect which we call æsthetic delight.

REFERENCES FOR READING.

On the scope and method of psychology, the following may be consulted: Hamilton, *Lectures on Metaphysics*, i. lects. vii. and viii; G. H. Lewes, *The Study of Psychology*, chaps. i.-iii.; Ward, article "Psychology," *Encyclopædia Brit.*, pp. 37, 38

CHAPTER II.

THE PHYSICAL BASIS OF MENTAL LIFE.

Connexion of Mind with Body. Since mental phenomena have as their concomitants in time and their determining conditions certain actions of the bodily organism, it seems desirable to take a brief survey of these before entering upon a detailed examination of the psychical processes themselves. In doing this, however, we shall try to keep to our *psychological* point of view, and regard the material processes involved merely under their aspect of conditioning factors of psychical events. Hence we shall not attempt any detailed description of the organic structures, which could not indeed be carried out in a psychological work, and can be easily obtained in physiological text-books.[1]

Common observation tells us that our mental life, its perceptions of objects, its feelings, its actions, stand in an intimate relation to our bodily life. Yet the first ideas of this connexion were vague, and when attempting to be definite (*e.g.*, as in referring the seat of the soul to the heart) inexact. It is the discoveries of modern science which have first enabled us to define the mode of the connexion with something like precision. By help of these we are now able to link on psychical processes with the functional activities of a special group of organs, *viz.*, the Nervous

[1] The English student may now obtain a sufficiently complete descriptive account of the nervous system, either in an elementary work on physiology, as Professor Huxley's excellent *Elementary Lessons*, or in a work on physiological psychology, *e.g.*, Professor Ladd's *Elements*, or the smaller *Outlines*.

System, and more particularly of certain central portions of these known as the Brain.

Structure of Nervous System: Nerves and Nerve-Centres. The nervous system is, so far as we are concerned with it here, a set of continuous structures built up of a highly organised matter. It is divisible into two portions: (*a*) a group of compact masses known as nerve-centres, lying within the bony covering of the skull and vertebral column, and (*b*) thread-like ramifications running from these nerve-centres to outlying or peripheral parts of the body and known as nerves.

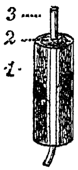

FIG. 1.—Nerve-fibre (magnified). 1, membranous tube (sheath of Schwann); 2, medullary sheath; 3, axis-cylinder.

The nerves are found to consist of bundles of minute white fibres. The more important class of these fibres have as their essential element a central band (axis-cylinder). This is enclosed in two sheaths which probably serve to insulate the fibre (see Fig. 1).

The nerves fall into two classes, which, though they appear to have the same structure, are marked off one from another by their mode of attachment at the periphery and at the centre, and as a consequence of this subserve distinct functions. Of these the first class are connected at their peripheral termination with some sensitive structure, as the skin, the mucous membrane of the stomach, and so forth. They are put into a state of activity at their peripheral end by a process of stimulation, and have as their function to convey nervous action to the centre. Hence they are called *afferent* or in-carrying and also *sensory* nerves.

The more important of these afferent nerves for the psychologist are the nerves of special sense which connect the peripheral organs of sense, the skin, the retina, and so forth, with the nerve-centres. The fibres of these nerves tend to separate towards the peripheral termination, and each fibre has its own terminal appendage, the several terminal appendages making together a sort of mosaic work. These appendages, which differ

greatly in the case of the different organs, constitute the proper "end-organ" of the sense. It is these, as we shall see, that are acted upon by the outer stimulus (as mechanical pressure, light) which excites the organ to activity.

The second class are (for the most part) attached peripherally to the muscles—those bundles of fibres by the contraction of which movements of the limbs, the heart, etc., are brought about —and have as their function to convey nervous excitation from the centres to these organs. Hence they are known as *efferent* or out-carrying and also as *motor* nerves. The most important of these motor nerves, again, for the psychologist are those which run to the striated or "voluntary muscles," as those of the limbs.

The chain of nerve centres or cerebro-spinal axis consists of masses of greyish and of white substance arranged in a very intricate manner. The essential element in the grey matter is the "ganglionic nerve-cell," a minute sac-like structure with neck-like projections or "processes". With these cells or corpuscles are mixed fibrous elements, and these last constitute the main constituent of the white substance of the nerve-centres.

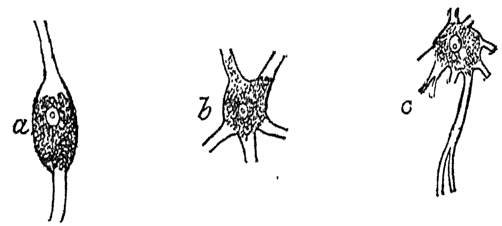

FIG. 2.—Ganglion nerve-cells. *a*, Bipolar cell from spinal ganglion (of a fish); *b*, cell from cerebellum; *c*, cell showing central origin of nerve-fibre.

There is reason to suppose that nerve-cells are connected by their processes with nerve-fibres, and that in this way structural continuity is maintained between one nerve-cell and another, and one region of the nerve centres and other regions. (See

Fig. 2 *c*.) The fact that motor fibres are attached to the anterior portion of the grey matter of the spinal cord, sensory fibres to the posterior portion, suggests that the central substance is throughout divisible symmetrically into two sides, a motor and a sensory, though this distinction is not fully established.

This chain of nerve-centres falls into a number of divisions, easily distinguishable by their shape, size, and the arrangement of the grey and white substance. The most obvious division is that of the narrow cylindrical spinal cord, and the bulbous globular mass known as the brain. In the cord the grey matter constituting the central organ forms the pith or axis, being surrounded by strands of nerve-fibre. The cord thus serves both as centres for connecting the sensory and the motor fibres of spinal nerves one with another, and also as a prolongation of these fibres towards the higher centres of the brain.

The transition from the cord to the brain is formed by an expansion known as the medulla oblongata. Then follow the different organs of the encephalon or brain itself. These are roughly divisible into (1) a group of inferior organs, *viz.*, the cerebellum or little brain, and certain smaller masses called the basal ganglia, and (2) the cerebral hemispheres forming the larger part of the brain. In these last we have the reverse arrangement of grey and white substance to that found in the cord. The grey matter forms the rind or cortex, and is arranged somewhat after the manner of foliage about a branching system of nerve-fibres.

These highest nerve-centres in the cortex are connected by bundles or skeins of nerve-fibre with corresponding regions in the other hemisphere, with the lower centres, basal ganglia, and lastly with the medulla and cord. These last fibrous paths undergo a more or less complete crossing or 'decussation,' so that fibres coming from one of the right limbs pass to the left hemisphere. The same thing is true of the "cranial nerves," those which enter the skull and attach themselves directly to one of the lower centres of the brain, and which include the nerves of special sense whose

end-organ is in the head, *viz.*, the eye, ear, organ of taste, and smell.

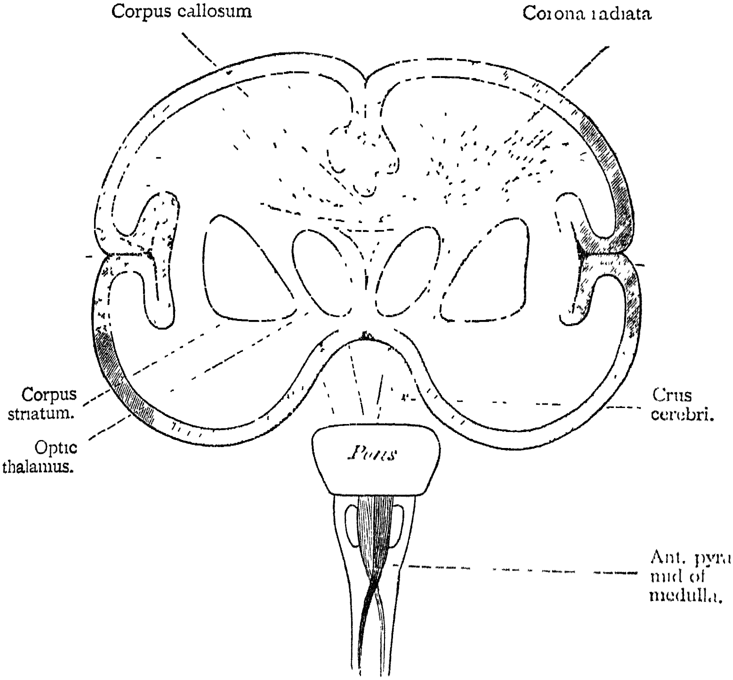

FIG. 3 (after Waller).—Diagram to illustrate the course of nerve-fibres from spinal cord to cortex, giving the general plan of the two hemispheres of the brain, with the position of the two chief basal ganglia (corpus striatum and optic thalamus), also the bundles of commissural fibres connecting the hemispheres.

It is to be added that the nerve-centres are richly furnished with blood-vessels. More particularly the brain is surrounded by a minute network of vessels by which its substance is amply supplied with arterial blood.

It is evident from this slight sketch of the Nervous System that it is a system of closely conjoined parts by means of which action at any one point, say of a sensory nerve, may be

propagated in a number of definite directions so as to affect other and distant regions of the system itself, and the end-organs connected with this system. Not only so, we see from the arrangement of the nerve-centres that they form a series of organs of growing complexity, admitting of more and more intricate and varied connexions between one point of the organism and other points. Thus the grey matter of the cord is a meeting-point for comparatively few paths afferent and efferent, and consequently its actions are marked by a high degree of simplicity and invariability. The higher centres on the contrary contain meeting-points for a much larger system of nervous paths, and consequently provide a field for more intricate and varied actions.

Function of Nerve-Structures: (*a*) Nerves. The nerve-fibres are, we are told, pure conductors Their sole function is to transmit nervous excitation from one point of the nervous system to another. But of the exact nature of this nervous activity little is known beyond the common assumption that it is some form of molecular vibration or tremor. It is found to have some important affinities with electrical action, but it must not be confounded with this. For one thing, the transmission of a nervous tremor or thrill is relatively slow, being about 100 feet per second.

The two classes of nerves marked off as afferent and efferent are known to have a marked difference of function. Under normal circumstances afferent nerves are only excited by way of their peripheral attachments (sensitive structures, end-organs), and have to conduct the state of nervous excitation or tremor from the periphery to the centres. Efferent nerves, on the other hand, are stimulated or 'innervated' by way of their central connexions, and have to transmit the nervous tremor outwards to the muscles.[1]

[1] It was formerly supposed that each nerve had its own peculiar and unalterable function. This view is known as the doctrine of *the specific energy of the nerves.* Nevertheless recent investigation has tended to show

(*b*) **Function of Nerve-Centres.** The function of the central element, the nerve-cell, seems to differ from that of the fibre. It is not purely conductive. The propagation of nerve-commotion along an afferent fibre suffers a retardation when it reaches the central cellular substance. And this delay is followed by an increase in the energy or intensity of the excitation when it issues from the grey substance. This increase in intensity is said to be due to a liberation of energy, which is an accompaniment of the breaking down of complex and unstable chemical compounds into relatively simple ones. This liberation of cell-energy or cellular discharge depends on the presence of oxygen in the blood, the supply of which is effected by the system of capillaries already referred to.

In addition to thus strengthening the incoming excitation the central elements discharge the important function of directing its after-course. Owing to the continuity of the central substance such excitation may be propagated in various directions. The tendency of nervous excitation to diffuse itself over the central area is spoken of under the name of Irradiation or Diffusion. Such diffusion, however, is limited from the first by special anatomical arrangements, and becomes more and more so as the brain develops by the formation of definite lines of customary propagation or connexion between one part of the brain and other parts.

Inhibitory Action of Central Structures. This restriction of the process of excitation within a definite circuit is closely connected with another function of the central organs, *viz.*, Inhibition. The activity of one region of the nerve-centres may,

that the function of nerve-fibres is not unalterable. Thus it is probable, as we shall see by-and-by, that in the case of the nerves of special sense the same fibres may exercise a variety of functions, that is, transmit unlike modes of excitation, answering to different colours, different tones, and so forth, according to the form of the stimulus that acts upon them.

when restriction has been effected, not only rouse another and connected region to its proper functional activity, but hinder or interfere with this, much as one kind of light interferes with or extinguishes another. Thus the process of motor innervation resulting on an incoming sensory stimulation in the cord, and known as spinal reflex, is greatly intensified when the higher centres of the brain are removed by decapitation, and this shows that these centres exercise an inhibitory influence on the lower ones. This inhibitory action of one central region on others is probably carried out by all portions of the central substance. It is presumably the physiological correlative of those mental processes which involve the *exclusion* of certain activities, as in keeping out irrelevant thoughts in concentration, restraining an impulse to act, and so forth.

Mode of Working of Nervous System. It would thus appear that the Nervous System has for its main work or function the transformation of sensory stimulation into motor excitation through the medium of a nerve-centre. Since the process of sensory stimulation is attributable directly or indirectly to the action of some external agent on some part of the organism, we may say that the nervous system is a mechanism by which the organism is able to carry out actions of adjustment or adaptation that bring it into correspondence with its environment.

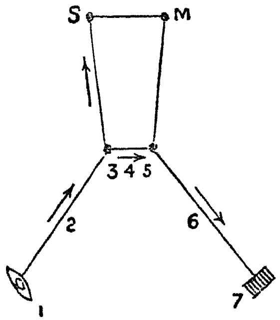

FIG. 4 (after Waller).—Representing shorter nerve-circuit in spinal reflex action. (1) Peripheral sensitive point; (2) Afferent nerve-fibre; (3) Spinal sensory cell; (4) Commissural (connective) fibre; (5) Spinal motor cell; (6) Efferent nerve-fibre; (7) Muscle.

The lower parts of this system subserve those responsive acts of self-adjustment which, being required frequently in precisely the same form, are carried out mechanically, and are only very slightly modifiable by changes in the

stimulus, such as movement of a limb away from some irritant substance. These actions are known as spinal reflexes; they involve a comparatively simple mechanism, which may be illustrated by the accompanying diagram, Fig. 4.

The higher parts subserve responsive actions which are more complex and variable in their form, and have more of the character of special adaptations, as in walking along an unfamiliar path in the dark; such actions are known as voluntary. These involve a much more extended and intricate mechanism, as may be seen by the diagram, Fig. 5.

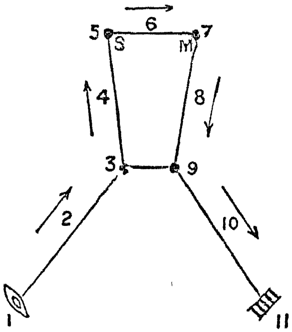

FIG. 5 (after Waller).—Representing longer nerve-circuit in voluntary action (1) Peripheral sensitive point; (2) Afferent nerve-fibre; (3) Spinal sensory cell; (4) Afferent tract, (5) Cortical sensory cell; (6) Commissural fibre; (7) Cortical motor cell; (8) Efferent tract; (9) Spinal motor cell, (10) Efferent nerve-fibre; (11) Muscle.

This work of the higher nervous mechanism involves a certain control over the lower parts. Thus in combining a new group of movements, as in learning to swim, the higher centres must be supposed to stimulate the lower to a new mode of co-ordinate action, which in time becomes mechanical. On the other hand, any variation of customary grouping of movements, as when a recruit tries to walk backwards, implies an inhibitory action of the controlling centres on those lower centres by which the customary co-ordination is mechanically carried out.[1]

The "Seat," or Special Organs of Consciousness. After looking into the working of the nervous system as a physical mechanism, just as if there were no conscious life attached to it,

[1] It has been assumed here that all movement is reflex in form, being initiated by a sensory process. According to some physiologists, however, there are movements called 'automatic' which issue from an immediate excitation of motor centres probably by some form of stimulus supplied by special conditions of the blood in the cerebral capillaries.

we have now to consider its relation to the psychical activities which constitute consciousness. Here our special object will be to determine first of all at what points, and secondly in what precise manner, the current of physical action which we call nerve-commotion is brought into relation to psychical action.

Our first problem concerns itself with what is called the "seat" of the mind, but is better translated into scientific language as the special organs of mind, or the "psychical centres". The question here referred to may be put thus: What actions of the nervous system are the immediate temporal concomitants of psychical activity?

That there is a special connexion between the cranium and mental activity is an idea which was reached by antiquity. Modern investigation confirms this idea and renders it precise. Experiment has shown not only that the stimulation of the peripheral region of a nerve precedes by an appreciable interval of time the appearance of a conscious sensation, but that if the connexion between end-organ and brain is sundered the outer half of the nerve may be stimulated without the production of any conscious phenomenon. Hence we conclude that the psychical result of exciting a sense-organ occurs only when the effect of this is transmitted to the central organs.

Not only so, modern research has established the proposition that our conscious states are not immediately associated with the actions of the lower centres of the spinal cord. These actions, as has been shown by stimulating the spinal nerves of decapitated animals, are reflex in form, and compared with the actions carried out by means of the brain-centres, uniform, like the movements of a machine. Hence they are commonly assumed to be unconscious, that is, unaccompanied by conscious activity.[1]

It appears to follow that psychical processes are specially re-

[1] This conclusion is not, however, accepted by all. Even a decapitated frog modifies his actions within certain limits, *e.g.*, rubbing off a spot of acid on the left side of his body with his right leg when his left leg has been amputated: and some, as Pflüger, would, on this ground, ascribe to the animal a subordinate "spinal" mind.

lated to the actions of the higher nerve-centres in the cranium. And this position has been well established by a chain of positive evidence.

The Brain as Organ of Mind. That the phenomena of our conscious life are connected with the actions of the brain is suggested by the fact that mental excitement, strain, or fatigue is apt to induce sensations which we commonly localise in the head. It is still more distinctly suggested by the common observation that an injury to the brain produces unconsciousness. When to such common observations science added the fact that the brain is the great central station or meeting-point of the nervous system, the inference that it has a special significance as an organ of mind became inevitable. The full proof of this connexion has, however, only been supplied by recent physiological research.

These investigations furnish a mass of consilient evidence of the most convincing kind in support of the proposition that the nerve-centres of the brain have a special significance as the organ of mind. Among these proofs may be instanced: (1) the demonstration that peripheral stimulation must be transmitted to the brain before sensation arises; (2) the discovery that mental activity is accompanied by an increase of circulation in the brain; (3) the fact that mental activity is followed by an increase in those waste-products which are known to be elements of nerve-cells (their phosphorised constituents); (4) a mass of facts (the outcome partly of pathological observation, partly of experimental destruction of different portions of the nerve-centres) going to show that injury to the brain is attended with some interruption of the psychical activities making up normal consciousness; (5) the important fact that any interruption of the supply of blood to the brain by means of one of the great arteries running to the organ is followed by a profound disturbance if not a suspension of consciousness; (6) the confirmation of this physiological evidence by the results of comparative anatomy, which show that the development of the brain and the degree of intelligence vary, roughly at least, in a direct ratio among different species of animals, races of mankind, and individual men.

Modern physiology has not only fully established the connexion between the brain and mental activity, but it has gone some way to make it probable that *it is the highest centres in the cortex of the cerebral hemispheres which form the immediate physical basis of our mental life*, so far at least as this involves clear consciousness. According to this view, it is only when sensory impulses are transmitted to the termination of the afferent fibres in the cortex that a distinct sensation arises. And all volitional initiation of movement takes its start in the same supreme region.

A further question arises as to the specific functions of different regions of the cortex. The attempt of the phrenologists Gall and Spurzheim to connect different faculties with definite localities on the surface of the brain has been condemned both by psychologists and physiologists. More recently the subject has been approached from the physiological side under the heading, the Localisation of cerebral functions. A series of experiments (supplementing the results of anatomical and pathological observation) has been carried out for the purpose of connecting definite regions of the cortex with particular varieties of psychical elements.

Such experiments have undoubtedly established special correlations between certain regions of the cortex and particular groups of psychical elements (sensations and conscious movements) and enable us to speak of particular centres of this and that order of sensations and movements. Thus physiologists are able to mark off, roughly at least, a particular centre for visual sensations, auditory sensations, the movements of the eye-balls, of articulation, and so forth. At the same time, there is no reason to think that particular psychical processes are related to *sharply-defined cerebral tracts* in the way supposed by phrenologists.

Correlation of Nervous and Psychical Processes. Having thus conjecturally mapped out the physical substratum of psychical processes, we may inquire into the general correlations between the two sets of operation involved. In what way or ways, it may be asked, does change in the nervous action affect the psychical action? What are the most definite aspects of the concomitance between the two sets of phenomena?

There seems to be a certain correlation in respect both of the elementary processes and of the mode of their combination. As we shall see more fully by-and-by, *quantitative* changes in psychical phenomena, *e.g.*, the increase or decrease of intensity of a sensation of light or sound, are connected with certain homologous changes in the stimulus engaged. Again, there is reason to suppose that *qualitative* dissimilarities in the psychical elements, as illustrated in the difference between a sensation of smell and of taste, or between a bitter and a sweet taste, correspond to differences in the mode or form of the peripheral stimulation. With respect to the correlation in the mode of grouping, it may be pointed out, even in this introductory stage, that a psychical process can, like a nervous process, be regarded as a sequence of a sensory or sensational, and a motor stage; also that the co ordination of psychical elements or particular states into the continuous tissue of our mental life or the "unity of consciousness," as it is called, appears to find its physical counterpart and support in the continuity, both of structure and of functional activity, of the brain-centres.

Cerebral and Mental Development. Again, the general correlation of brain-action and mental process becomes of importance to the psychologist in tracing the course of psychical development. There is good reason to suppose that the brain and the mind develop *pari passu*. The growth of the brain as compared with that of the whole body follows a curious course. As common observation tells us, the brain at birth is greatly in advance of the body both in size and in weight. It almost reaches its maximum size by about the end of the seventh year. After this it undergoes a prolonged process of development, in which its elements (cells and fibres) multiply in number, more numerous connexions between cell and cell are built up, and the several distinctly-marked regions (folds or convolutions) become better defined. This development of the cerebral organs presumably keeps pace with and serves to determine the advance of mind.

The dependence of mental development on cerebral changes

is illustrated in a peculiar way in the phenomena of Habit. By the term Habit is meant the transformation of once fully conscious mental processes into semi-conscious or automatic actions, as in the practised actions of walking, writing, and so forth. This result depends, it is evident, on the perfect co-ordination of certain central elements. As a result of such perfect "organisation" of psychical actions nervous energy is liberated for the building up of *new* formations.

Physical Substrate of Individuality: Temperament. While the nervous system thus subserves the common typical form of the mental life, it constitutes also the basis of individual character. It is a fact familiar to all good observers of children that clearly-marked differences in mental aptitude and disposition show themselves within the first years of life. These facts, which point to an original and connate idiosyncrasy or individual character, appear to necessitate the supposition that the nervous system, though exhibiting the same typical plan in all human beings, has its pattern of structure somewhat modified in the case of different individuals. Observation has shown that exceptional powers of intellect are correlated with special richness of convolution; and it is probable that such extraordinary complexity of structure is predetermined by the congenital conformation of the brain. Not only so, there is little doubt that differences of mental disposition, as that between the quick, lively, and slow, tenacious mind, have their physiological counterpart in the functional differences of the nervous system. The old doctrine of Temperament was a crude attempt to fix the physical substratum of such individual differences. A more complete knowledge of the nervous system and its mode of action may one day enable the physiologist to substitute a truly scientific doctrine of temperament.

Modern science has familiarised us with the idea of a hereditary transmission of mental as well as of physical character. The nature of such hereditary transmission will be considered later on. Here it is enough to point out that the transmission of any special aptitude, taste, or moral inclination from parent to child

takes place through the medium of the nervous system. To every distinct inherited trait or tendency of mind there corresponds presumably some peculiarity in the original constitution or *set* of the individual's nervous system. In this way we all bring into the world, wrought into the very texture of our brain-centres, the physical basis of our future individual character, intellectual and moral.

Practical Bearing of the Correlation of Mind and Brain. The correlations between psychical and physical action just traced out have an obvious practical bearing. The fact that every psychical process is correlated with and conditioned by a physical one, that our mental life is made up of a group of *psycho-physical* processes, makes it imperative that in guiding, controlling, and economising the mental activities we should constantly refer to the physiological conditions. Since the amount of mental activity at any time depends directly on the amount of disposable cerebral energy, it becomes a matter of the first consequence, in order to secure the most efficient thought and action, that we should satisfy the conditions of vigorous cerebral action. Brain-power may be lowered by want of nutrition, by insufficient supply of oxygen, by any organic cause tending to enfeeble the body generally, as also by fatigue of the brain itself. Hence the importance of discovering and choosing efficient moments, that is, moments when the tide of brain-power is at its highest, for all the severer forms of mental activity. This applies not only to the economical regulation of our own brain-activities, as in choosing the morning after the repose of sleep for hard brain-tasks, avoiding undue prolongation of study, the remitting of brain work for bodily exercise or repose, and so forth, but to the economical management of brain-power in the young.

In addition to the bearing of the general dependence of mental activity on brain-vigour, the modern doctrine of localisation of brain function suggests the practical desirability of *varying* mental occupation. Taking up a new pursuit, as in passing from some problem of thought to the contemplation of a work of art, often serves in lieu of complete relaxation of brain-work; and this

appears to find its explanation in the fact that different kinds of mental activity, especially when distinct sense-organs are involved, engage different central structures. The lessening of brain-fatigue by help of frequent change of lesson in the school probably owes a part of its value to this circumstance.

REFERENCES FOR READING.

A fuller account of the Nervous System in its connexions with mind may be found in the elaborate treatise of Ladd, *The Elements of Physiological Psychology*, or his smaller work, *The Outlines*. With this may be usefully compared Ferrier's *Functions of the Brain*, and Bastian's *The Brain as an Organ of Mind*.

PART II.

GENERAL VIEW OF MIND.

CHAPTER III.

CONSTITUENTS OF MIND.

Mental Life Divisible into Certain Functions. Our mental life or "stream of consciousness" shows itself as soon as we inspect it to be of an intricate weft-like composition. The different strands or threads of this weft we are able by psychological analysis to consider apart. (See above, p. 7.) Such analysis of the concrete 'states of mind' or "psychoses" into their constituent factors leads on, as has been pointed out, to classification. Thus by distinguishing in a state of mental perplexity an intellectual element, the presence of certain ideas, and a feeling of distress, we may be said to bring it into a relation of likeness to other intellectual states and to other feelings, and thus to group it under each of these heads or classes.

There is great need of an improved terminology to mark off the facts of our conscious experience. The expression "mental state," which is commonly used, is open to the objection that it suggests a sharply defined and relatively permanent condition, whereas psychical phenomena are essentially continuous changes or transitional movements. The phrase 'mental operation,' or still better, 'process,' is less open to this objection, and indicates the fact that the least distinguishable phase in the current of our

conscious life has something of movement in it. The same idea of a movement or process is expressed by the newly introduced term "psychosis," which serves as the correlative of "neurosis" or nerve-process.

Feeling, Knowing, and Willing. The popular psychology embodied in every-day forms of expression has long since drawn certain broad distinctions among mental phenomena. Thus we commonly describe a number of operations, such as, observing what is present to the senses, remembering and judging as Intellectual operations or acts. So, again, we bring a variety of mental states, as fear, hope, disappointment, vindictiveness, remorse, under the general description of *Feeling* or Affective States.[1] And, lastly, we bring together other operations, such as the actions we perform for a purpose or end, and the processes which accompany those actions, as deliberating and resolving, and mark them off by the general description of *volition*, *willing*, or *active* states.

These three categories have been regarded by most modern psychologists as indicating the primary functions or fundamental modes of activity of mind. All that the mind does can be brought under one or more of the following heads: (*a*) Knowing, Cognition, or Intellection; (*b*) Feeling, States of Pleasure and Pain, or Affective States; and (*c*) Willing, Conation, or Active Processes.[2] Our mental life may thus be said to be composed of ever-varied combinations of these functional activities as its ultimate factors or constituent elements.

[1] As there is no adjective corresponding to the substantive feeling, it is customary to use *emotional* state as an equivalent for feeling. It is to be noted, however, that the term emotion is properly confined to the higher and more complex feelings.

[2] The terms commonly used to mark off the three phases of mind are somewhat ambiguous. Thus 'feeling,' which here indicates states of pleasure and pain, is not only used as the name of a particular sense (touch), but also as the generic term for all simple psychical phenomena, *e.g.*, sensations. There is a similar ambiguity in the terms action and active, which are now employed generically for all mental operations, now specially for the conative or volitional phase of these.

In thus adopting the popular scheme of three broadly distinguished modes of mental activity, the psychologist seeks by a further application of analysis to detect the essential or radical element in each. Thus he aims at penetrating below the variety of intellectual operations which we popularly refer to distinct 'faculties,' as Observation, Reason, and at finding the common elementary process or simple functional activity that runs through this variety.

Primary Intellectual Functions. If we compare these different types of intellectual operation we may readily discover such an elementary process. To perceive, and to think, are alike reducible to certain processes carried out on materials supplied by the senses, and known as Sensations. Thus when I perceive an orange I group together a number of sensations, those of a particular colour, taste, and so on; and, moreover, recognise the colour, etc., now presented to me as similar to what has been presented before. So in thinking about the qualities of oranges or of fruit in general, I am making use of, and carrying out certain operations upon, materials obtained, in the first place, through the senses.

The primary intellectual functions consist in establishing or consciously realising certain *relations* among the data supplied by sense.[1] Of these relations the most important are Similarity or Agreement, Difference or Dissimilarity, and connexion in time or place constituting wholeness or unity. When I recognise a friend in the street, I am aware, more or less distinctly, of a relation of likeness between what is now seen and what was seen before; I am also (vaguely) aware of relations of difference between this object and other objects. Not only so, by connecting what is now presented to sight with what I already know, I take up the impression into a whole, *viz.*, the idea of my friend with all the associations or complications which this idea involves. These elementary pro-

[1] The fact that intellection has to do with apprehending relations is brought out in Herbert Spencer's theory of mind as made up of feelings, *i.e.*, simple psychical states and "relations between feeling". (*Principles of Psychology*, vol. i. part ii. chap. ii.)

cesses may be marked off as Assimilation, Differentiation, or Discrimination, and Association.

It is to be noted that while Differentiation introduces separateness or distinction of parts, both Assimilation and Integration effect Conjunction and Combination. Hence we may say that intellection consists in a double process of Separation and Combination, Differentiation and Integration, or Analysis and Synthesis.

The processes of intellection further involve a property which is sometimes given as a primary element of intellect, *viz.*, Retentiveness, or the power of retaining past impressions, and recalling them when no longer supplied by their external cause. Thus, in the illustration just considered, it is evident that I should not recognise the moving form as my friend if this peculiar appearance to the eye had not been firmly stamped into the mind so as to be revived now. It is through this retentive power of the mind that the presentative element given to us in sensation afterwards reappears under a re-presentative form.[1]

Retentiveness is included by Dr. Bain with Consciousness of Difference and of Likeness as a primary function of intellect.[2] Its position in Intellect is, however, a unique one. The mere retention of an impression does not constitute knowing, or cognition, as the processes of discrimination, etc., constitute it. It is rather the underlying condition of intellective activity than a part of the knowing process itself. As we shall see presently, it underlies the whole process of intellectual, and indeed of mental development.

Constituent Elements of Feeling: Pleasure and Pain. In the case of the feelings or affective states the elementary functions stand out pretty clearly. To be affected by joy, grief, fear, or hope is to be affected agreeably or disagreeably, that is to say, to experience pleasure or its opposite, pain, in a greater or less degree. All modes of feeling, from the lowest forms which connect themselves with the bodily life, as hunger, warmth, to the

[1] Presentative, presentation, refer to what is immediately presented to us by the channel of the senses. Re-presentation is the revival of this in the shape of a mental image.

[2] See *Compendium of Mental Science*, book ii. § 1.

highest forms known as emotions, as Love, Admiration, Regret, exhibit this double element in feeling. And, according to the more common psychological view at least, there is no feeling which does not exhibit the colouring or 'tone' of the agreeable or disagreeable.[1]

Sensibility to pleasure and pain may thus be said to be the essential element in our affective states or emotional life.

Fundamental Functions in Willing. As in the case of Cognition and Feeling, so in that of Conation or Volition we may resolve the variety of operations covered by the term into certain constituent functions.

Volition appears to follow two main directions. These are (1) the *bodily* direction of motor or muscular action, as in moving a limb; and (2) the *mental* direction of attention, as in listening for a sound.

These two directions of volitional activity are clearly marked off from one another in common thought. We know the difference between exerting muscular force, as in lifting a body with the arm, and scrutinising the same object with an attentive glance Nevertheless they will be found to be closely connected. All attention involves *some* muscular action, as in fixing the eye on an object: on the other hand, all voluntary movement takes place by directing attention to the *idea* of a movement. It follows that all voluntary action has as its essential factor *attention*, which again receives its characteristic colouring from the psychical concomitant of *muscular* action, *viz.*, the peculiar sensation of muscular exertion or strain.

Mental Functions and Faculties. The attempt to reach elementary functions of mind and to exhibit all concrete mental operations as compounded of these is comparatively recent. The tendency of psychologists has been to separate as sharply as possible different modes of operation by referring them to distinct *faculties*. Thus will was viewed as a faculty distinct from intellect; and within the domain of intelligence, observation as a faculty

[1] This point is, as we shall see later, not conceded by all psychologists, some holding that feeling may be neutral or indifferent as regards pleasure and pain.

distinct from imagination, this distinct from judgment, and so forth. The extreme form of the faculty-theory was a view of mind as made up of a number of separate powers, each of which carried on its operations with supreme indifference to all the rest, and as having no more organic unity than a number of sticks fastened together in a bundle. This way of regarding mind is still met with not only in every-day unscientific 'psychology' but in works on education. The faculty-hypothesis, which has been severely criticised by Herbart, Wundt and others, is open to the fatal objection that it overlooks the organic unity of mind.

Physiological Concomitants of Mental Function. If there is a general correlation between mental and nervous processes, it is to be expected that corresponding with each of the distinct varieties of mental function, feeling, intellection, and conation, there will be a particular division or aspect of nervous process, and this correspondence may be traced up to a certain point. It has been pointed out that the typical nervous process falls into two parts, *viz.*, sensory stimulation and motor innervation, or motor discharge. Now, all intellectual activity is carried out upon, and so involves sensations, that is, the psychical results of sensory stimulation; either in their original form as presentative elements, *e.g.*, impressions of colour, or as worked up into what are known as representations (images, ideas). Accordingly intellection may be said to be specially related to sensory processes, and to the co-ordination of sensory components by central connexions. In like manner volition stands in a special relation to the motor side of the nervous system. The nervous correlatives of Feeling are less obvious. In respect of its origin it stands in close relation to sensory processes, in respect of its manifestation, to motor processes.

The tripartite division of mind into Feeling, Cognition, and Conation has only recently been adopted. The ancient mode of dividing mind as fixed by Aristotle was bipartite into intellect and will, a division which still survives in popular psychology ("the intellectual and moral faculties"). The recognition of three functions is due to the German psychologists of last century. Even now psychologists are not agreed in regarding the three modes of mental activity as equally primordial. Thus in Germany Herbart and his school tend to make presentation, that is, the cognitive element, funda-

mental, and to view feeling and conation as secondary and derivative. A somewhat similar attitude is taken in this country by Hamilton, in so far as he regards consciousness as essentially cognitive, and at the same time the mental condition of all varieties of mental states. Others again, as Horwicz, would give to feeling a fundamental position on the ground that in the development of the infant as also of animal life it is the first and primordial manifestation of mind.

Relation of Feeling, Knowing, and Willing. Supposing these three modes of mental functioning to be radically distinct, a further question arises as to the way in which the three constituents come in, and behave one towards another, in the actual performances of our concrete minds.

Now, at a first glance there appears to be a direct antagonism between these psychical factors, so that no one can operate fully save through the momentary repression of the others. Thus all strong feeling (emotional excitement) tends to preclude at the moment the processes of intellection and of volition. Thinking implies, at the moment, a certain subsidence of the feelings, and also a considerable suppression of outward action or movement. Indeed, we may say that *no one phase can appear in its highest intensity without tending to eclipse for the time the other phases.*

Yet while there is this measure of opposition between the three functions as rival tendencies to become conspicuous and predominant, we are not to suppose that they ever act in perfect isolation one from the other. The mind is an organic unity, and its activities have the closest degree of organic interdependence and interaction.

To begin with one of the most familiar of these relations, there is a close connexion between thought and feeling. A large number of our feelings (the Emotions) are called forth by, and indeed organically bound up with, intellectual states (ideas, recollections, anticipations). Conversely, feeling influences the course of the thoughts in many and profound ways. We habitually think the thoughts which please us, that is, which connect themselves with and gratify our feelings. Again, feeling and thought interact with conation. We act because we are moved by feeling and guided

by cognition or thought. Reciprocally, volition directs and controls the process of thought or intellection, and, in close connexion with this, the flow of feeling.

If we take any mental state or "psychosis" in its concrete fulness, we shall by close inspection detect each of the functions co-operating in some degree. Thus when we are said to be affected by passionate grief it is easy to recognise a mass of more or less distinct ideation,[1] and a number of impulses to action. It may be said then that *all complete psychoses are compound products into which the three psychical functions enter as elementary factors*.

A further question raised by Lewes, Ward and others is whether the three functional activities uniformly combine in one mode of arrangement or scheme. If we start from the physiological side, the fact that the typical nervous process is reflex suggests at once that the cognitive precedes the conative phase. And there is no doubt that many of our concrete mental states or psychoses lend themselves to the scheme, a presentation or representation attended by feeling leading on to conation. Yet to attempt to force all our mental processes into one mould in this way is futile. The mental functions *interact*, that is, act reciprocally one upon another. Thus, while the cognitive element directs the conative process, the conative process in the shape of attention is in its turn an essential factor in every complete process of intellection.

It follows from the above that we cannot classify our concrete mental states or psychoses by bringing each under one, and only one, of these heads as if it were a *pure* feeling, cognition or volition. Strictly speaking, every variety of mental experience can be brought under any one of these three heads according as we view this or that constituent element. At the same time most of our mental operations are characterised by a sufficiently marked preponderance of one of the phases to justify us in referring it to this rather than to the others.

[1] 'Ideation' is the word now frequently used for the process of forming ideas. It is thus equivalent to "representation," in its contrast to "presentation".

Truths or Laws of Mind. We saw above that the psychologist analyses and classifies mental phenomena in order to go on to establish general propositions about them. These are known as truths of mind. The most important of them are commonly spoken of as laws of mind. These truths or laws set forth the *relations* of psychical phenomena, whether among themselves or between them and the correlated physical processes. The most important of these relations are *connexions in time*, and more particularly relations of dependence or interdependence. Psychological laws, like those of physical science, seek to account for a phenomenon by formally enumerating the conditions, which, taken together, result in its production.

Here again mental science is supplementing and rendering precise the inductions reached by popular thought. Men have for ages observed certain relations of dependence between circumstances and character, and one trait of character or habit and another. All the well-known sayings about character and life embody these observations. Such trite remarks as "experience is the best teacher," "first impressions last longest," contain the rough germ of psychological truths. The psychologist seeks to take up these "empirical generalisations" into his science, exhibiting them as consequences of his more accurate scientific laws.

As an illustration of such a psychological principle we may take the well-known Laws of Association, which set forth the fact that when particular conditions are realised ideas will be revived. These laws are universal in the sense that they will be found to apply not merely to intellectual phenomena or presentations, but to feelings and to actions.

In thus seeking to connect psychical phenomena with their conditions the psychologist may sometimes content himself with a reference to *immediately preceding conditions*. Thus he may explain what is known as a *percept* as the product of the process called *perception*, in which process sensations and other factors take part. But, as already pointed out, a complete explanation of psychical phenomena will require him to go beyond this, and

to view the present psychical process as in part determined by *remote antecedents*. Thus the Laws of Association explain the suggestion of ideas one by another as the result of a conjoint occurrence of the original sense-experiences. The full carrying out of this idea of psychological explanation takes us on to the *genetic* or historical view of mind spoken of above.

While thus seeking to formulate laws of the greatest generality, the psychologist will also aim at pointing out more special conditions. Thus he will formulate the particular conditions, psychical and physical, of feeling as distinct from presentation, and further specialise his principles so as to enumerate the particular group of conditions which determines the growth of some variety of feeling, as the Moral Sentiment.

REFERENCES FOR READING.

On the Analysis or Division of Mind the reader may consult Bain, *The Senses and the Intellect*, Introduction; Ward, article "Psychology," *Encyclopædia Britannica*, p. 39 ff.; and Höffding, *Psychology*, iv.

CHAPTER IV.

PRIMITIVE PSYCHICAL ELEMENTS: SENSATIONS, ETC.

Elements and their Combination. In the preceding chapter we have distinguished between the ultimate constituents of Mind. These affective, intellective, and conative factors indicate different phases of the mental life and different directions of mental development. We have now to trace the development of each constituent, so far as this is possible, apart from the others, from its most rudimentary to its mature form.

This exposition of the threefold movement of development will necessarily begin with an account of the elements, or those simplest psychical phenomena with which the mental life of the individual begins. These are to be found, as already observed, in sensations and other simple phenomena closely conjoined with these. In the present chapter we shall be concerned with these elements. In a succeeding chapter we shall inquire into the processes by which these elements are combined into higher and more complex forms.

(A) SENSATIONS.

Definition of Sensation. The term Sensation, as commonly used, has a certain ambiguity. In every-day language we apply the name to those simple mental affections which are connected with variations of bodily state, as sensations of cold, of hunger, of cramp. We hardly describe the mental effect of light, sound, and so forth, as sensations. Psychologists have long since extended the denotation of the term so as to include all the simple psychical phenomena arising immediately out of the action of the senses.

A sensation, being an elementary mental phenomenon, cannot be defined by being resolved into anything more simple. Its meaning can only be indicated by a reference to the nervous processes on which it is known to depend. Accordingly, a sensation may in a manner be defined as *a simple psychical phenomenon resulting from the stimulation of the peripheral extremity of an afferent nerve when this is propagated to the brain* (psychical centre or 'seat of consciousness'). Thus the stimulation of a point of the skin by pressure, or of the retina of the eye by light, gives rise to a sensation.

The more important of our sensations, those of the five senses, are produced by the action of some external agent, as pressure or light, on the end-organ. But it is not desirable to refer to this in our definition. In the case of many of our "organic" sensations, those due to changes in the vital processes, as hunger, thirst, there is no such external agent at work. It is to be noted that a pure elementary sensation according to this definition is, so far as we know, a fiction, postulated only as a necessary starting-point. What seems a pure sensation to us in mature life when we begin to study it is really complicated by *residua* of past sensations, and is the result of rudimentary processes of assimilation and integration.

By defining the term we are able to define the corresponding abstract term, Sensibility. This means the capacity of experiencing or being affected by sensations. It is to be noted that sensibility, like sensation, refers to the *psychical* effect, and not to the physiological process. It is true that we are wont to attribute sensibility to the portion of the organism in which the process of stimulation is set up, as the hand, the tongue. But this is due to that unalterable habit of projecting and localising our sensations, the origin of which will be dealt with by-and-by.

Presentative and Affective Element in Sensation. If we examine our sensations we may, in most cases at least, easily distinguish two elements or aspects which clearly contrast one with another. Thus a sensation of taste, say that of a pear, has a particular character (or characters) by means of which we come to know what this sensation stands for, *viz.*, the pear. This element may be called the intellectual element since it subserves

cognition, or the presentative element inasmuch as it enters into the "presentations of sense" or sense-perceptions to be explained hereafter. But the flavour of a pear has a second and distinct aspect, *viz.*, a pleasantness or agreeableness, in consequence of which it is liked, prolonged, and desired. This is a properly affective element, and may be marked off as sense-feeling, that is to say, that elementary phase of feeling which is immediately involved in sensation. As we shall see presently, the relative proportion of these two elements varies greatly in the case of different classes of sensation.

General or Common Sensation: Organic Sense. All parts of the organism supplied by sensory fibres from the cerebro-spinal system give rise to sensations. These fall into two main classes: Common or General Sensation, and Special Sensation. The former involve no special structure (end organ) at the peripheral termination of the nerve-fibres, the latter do involve such a structure. The common sensations together make up what has been variously called the organic or the systemic sense.

Common sensation includes certain sensations which result from changes in the skin and the outer region of the body generally, including the special organs as the eye and the muscles, and also other sensations connected with the internal vital organs. The former comprise sensations of tickling, tingling, shivering, certain muscular sensations, as cramp, the painful sensations resulting from severe pressure and laceration of tissue, and so forth.[1] The organic skin sensations have to be carefully distinguished from the sensations of touch proper. The internal sensations are those which accompany special conditions, and particularly all disturbances, of the vital functions, as those of tight-breathing, hunger, indigestion, local inflammation and heat.

These common sensations are apt to blend in a mass, so that it is exceedingly difficult by analysis to single them out for careful observation. So far as this is possible we find that they have

[1] It is not certain whether the sensations of muscular fatigue should be included under organic sensations, or whether they belong to the class of *special* muscular sensations to be spoken of presently.

very little of a definite presentative aspect, corresponding to the peculiarity of a sensation of blue colour, or of a bitter flavour, while they have a strongly marked affective tone (agreeableness or disagreeableness).

Owing to their lack of distinct presentative character and to the fact that they are not the direct effects of the action of external objects but involve a change of condition in the part affected, the common or organic sensations give us no knowledge of the external world. They can no doubt inform us to some extent of the condition of the organism itself, and hence they have been described as the "barometer of our life-process".

Specialised Sensibility: Special Senses. The specialised varieties of sensation arising through the stimulation of the eye, the ear, and so on, are marked off one from another by great definiteness of presentative character. This peculiarity, as already pointed out, is connected with the fact that each sense has its own specially modified structure or organ, as the eye or the ear, which structure is peculiarly adapted to the action of one variety of stimulus (ether vibrations, air waves, etc.). Owing to this definiteness of character the special sensations are much more susceptible of being discriminated, assimilated and integrated than the organic sensations. Moreover, these sensations are (in ordinary cases) brought about by the action of *external* agents or objects lying outside the organism, for which reason they are often spoken of as sense-impressions or impressions of sense. Hence they are fitted to yield us knowledge of the external world. It is the special senses which will chiefly occupy us in tracing the development of intelligence.

The special senses are the well-known five, sight, hearing, touch, smell and taste. These, it is evident, each involve a special mode of sensibility, and a particular kind of 'end-organ' fitted to be acted on by a certain kind of stimulus. Whether we ought to add to these a sixth sense, the muscular, will be considered hereafter.

Distinguishable Aspects or Characters of Sensation. The importance of the special senses depends, as we have seen,

on their possessing certain presentative aspects or well-defined characters, whereby they are fitted to be signs of qualities in external objects, as well as of the changes which take place in these. The sum-total of our knowledge of things is limited by the number of distinguishable characters among our sensations. We will first inquire into these distinguishable characters generally, and then briefly indicate their varying importance in the case of the different senses.

(A) **Intensity.** One obvious difference of character among our sensations is that of intensity. The difference between a bright and a dull light, a loud and a soft sound, is appreciated through what we call a difference of intensity in the respective sensations. The subjective differences correspond to objective differences in the strength of the stimuli. If, as the physicist tells us, every form of stimulation, whether ether or air vibrations, or mechanical pressure, is a variety of movement, we may say that the intensity of a sensation is specially correlated with the breadth or amplitude of movement in the stimulus.

All classes of sensation, including the organic, exhibit differences of intensity. Those of the special senses exhibit them in greater number or finer gradation than other sensations. We cannot distinguish two shades of hunger as nicely as we can distinguish two degrees of intensity in the sensations of light and of sound. Such minute differences are intellectually important as a clue to the precise nature or structure of bodies, the degree of force exerted by them, their exact distance from us, and so forth. Thus a sensation of light of given intensity indicates (according to circumstances) a particular degree of brightness in an object (*e.g.*, a flame, a mass of snow), or its degree of proximity to the eye.

It is natural to ask whether these differences can be exactly estimated. Such a quantitative measurement of sensational intensity would, it is evident, serve to give to psychology something of that quantitative exactness which Kant and others have desiderated. Of late an attempt has been made to do this. This

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Relation of Intensity to Strength of physicist has special apparatus by which th certain at least of the stimuli of our senses, can be estimated and varied. By help of su been found possible to apply a graduated se sense-organ, and to note the precise effect ments of the stimulus on the resulting se searches belong to the new department of exp known as Psycho-physics.

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an increase in the intensity of the sensation, s must be increased by ks, where k stands for some constant fraction, as $\frac{1}{10}$.[1]

These results may be expressed as follows: *In order that the intensity of a sensation may increase in arithmetical progression, the stimulus must increase in a geometrical progression.* This is known as Weber's or Fechner's Law. The law has been found to hold good within certain limits only.

The magnitude of the fraction representing the increment of stimulus necessary to produce an increase of sensation determines what has been called the *Discriminative Sensibility*. The smaller the fraction the greater the discriminative sensibility. Thus the discriminative sensibility of the finger-tip to pressure is about twice that of the sensibility of the shoulder-blade, the fractions being approximately $\frac{1}{6}$ and $\frac{1}{3}$.

(*c*) When the stimulus is increased up to a certain point any further increase produces no appreciable increase in the sensation. Thus a very powerful sound may be increased without our detecting any difference. Similarly in the case of a light-stimulus. We do not notice any difference in brightness between the central and peripheral portions of the sun's disc though the difference of light-intensity is enormous. This upper or maximum limit has been called the "height of sensibility" of a sense.

(B) **Quality of Sensation.** In addition to differences of intensity in one and the same kind of sensation, we have differences of kind or quality among our sensations. The group of sensations making up a particular sense, as those of sound, are marked off from other groups by a broad difference of *generic* quality. This is the most obvious difference, and the one first distinguished. Owing to their disparateness or heterogeneity, the sensations of different senses cannot be compared one with another as different tones or colours can. It is only in rare cases, and more particularly in that of taste and smell, that such disparate sensations are ever confused one with another.

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Relation of Intensity to Strength of Stimulus. The physicist has special apparatus by which the exact quantity of certain at least of the stimuli of our senses, *e.g.*, luminous rays, can be estimated and varied. By help of such apparatus it has been found possible to apply a graduated series of stimuli to a sense-organ, and to note the precise effect of successive increments of the stimulus on the resulting sensations. These researches belong to the new department of experimental psychology known as Psycho-physics.

Among the results of this line of research are: (*a*) Every stimulus must reach a certain intensity before any appreciable sensation results. This point is known as the threshold or liminal intensity of sensation.

The situation of this point determines what has been called the *Absolute Sensibility* of an organ or part of an organ. Thus if two portions of the skin, A and B, differ in respect of their sensibility to pressure in such a way that a slighter force of impact (mechanical pressure) causes a sensation in the case of A than in that of B, we say that A has greater absolute sensibility than B.

(*b*) When the threshold is passed an increase of the stimulus does not always cause an increase in the intensity of the sensation. A very slight increase (increment) may produce no appreciable effect. It is further found that the amount of increase of stimulus required to produce an appreciable difference in the sensation varies with the *absolute* intensity of the stimulus. Thus a very slight addition to a light-stimulus which would be sufficient to produce an increase of intensity in the case of a feeble sensation would produce no effect in that of a powerful one. The greater the intensity of the stimulus already at work the greater must be the increase of stimulus in order that a perceptible difference in the resulting sensation may arise. It is found that (within certain limits in the median region of the intensity scale) the required increment is directly proportionate to the intensity of the stimulus. Thus, whatever the value of *s*, the stimulus, in order to produce

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specific quality within each sense. Thus there are the differences of quality answering to different colours in sight, to sounds of different pitch and of different timbre or musical 'quality' in hearing, and so on. These differences of quality are much sharper or more definite in the case of some sensations than in that of others. They are only very vague in the region of organic sensations, and are much less definite and easily distinguishable in the lower senses (taste and smell) than in the higher. Such differences, like those of intensity, serve as a clue to the properties of external objects. The difference between gold and iron is partly a difference of colour-quality.

Physiological Conditions of Quality. Quality of Sensation, like intensity, presumably has its special physiological conditions. The generic differences, *e.g.*, those of sensations of smell, of sound, etc., are correlated with important differences in the mode of stimulation, as that between the action of ether vibrations or light on the retina of the eye and mechanical pressure on the skin. These physical differences in the external stimuli correspond, as we have seen, to physiological differences in the special organs. Each organ is specially constructed so as to react on the application of a particular kind of stimulus.

With respect to the physiological equivalents of specific differences of quality, we know certainly in the cases of sight and hearing that qualitative change in the sensation answers to a certain amount of change in the form (wave length) of the stimulus. And it seems reasonable to suppose that such differences affect the character of the resulting molecular activity of the nervous structures.

A further question already touched on is whether, and if so how far, qualitative differences involve in every case distinct nervous structures. We may suppose that the difference between red and blue, sweet and bitter, is correlated either with the separateness of the nervous elements (peripheral and central) involved, or merely with a difference of functional activity in the same elements. Modern research has gone to show that in certain cases, *e.g.*, sensations of hearing and of sight, there is a multiplicity

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of nervous elements engaged. On the other hand, it cannot be said that separateness of structure has been made out in the case of every ultimate difference of quality.

A difference of quality, though sometimes confused in popular language with one of quantity (*e.g.*, in regarding black and grey as dissimilar qualities like colours), is in general easily distinguishable from the last.

Not only is quality distinct from quantity, but it is independent of this in so far as it is not necessarily affected by changes of intensity. At the same time this independence is not complete. Thus after a certain increase in intensity quality becomes less distinct. As all colours grow very bright they approach one another and tend to become whitish. Similarly the extremities of great heat and great cold lose their qualitative dissimilarity and tend to be confused one with another.

Extensity: Local Distinctness. Next to intensity and quality the most important feature of sensation is massiveness, volume or extensity. Sensation varies in amount or quantity not only with the strength of the stimulation, but with the number of nervous elements stimulated or *area of sensitive surface engaged.* The extreme difference shows itself between an 'acute' sensation, as that arising from the pressure on the skin of a pin point, and a 'massive' sensation, as that arising from an extended pressure on the skin. Differences of extensity must be carefully distinguished from those of intensity. It is one thing to increase pressure at a point of the skin, as by piling up a column of sixpenny pieces, another thing to spread a given degree of pressure over a larger surface, as in laying the sixpenny pieces side by side. Extensity is thus a new quantitative aspect or dimension of sensation.

Common observation tells us that when two points of the skin sufficiently far apart are stimulated we experience not one continuous but two distinct sensations. This shows that sensations received by way of distinct and isolated nerve-fibres are (within certain limits at least) distinguishable one from another. This fact we will call the local distinctness of sensation. This separateness must be viewed as original and anterior to that spatial interpretation of points which, as we shall see, probably comes later. The physiological basis of such a primordial dis-

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tinctness of sensation is to be looked for partly in the fact of the insulation of the several nerve-fibres, and partly also in certain differences in the whole nerve-process which appear (in the case of the skin at least) to characterise stimulation of different points of a sensitive surface.

Extensive magnitude and local distinctness of sensation are only found in a definite and precise form in the case of two senses, touch and sight. We do not appreciate extent or distinctness of points with any degree of clearness in the case of the organic sensations, the sensations of taste and smell, or even those of hearing. The probable reason for this seems to be that in the case of touch and sight we have special physiological arrangements which are wanting in the case of the other senses. These consist in the existence of a spread-out sensitive surface supplied by a system of isolated nerve-fibres arranged in a mosaic-like order, and so capable of being separately stimulated by properly-placed stimuli. The skin and the retina of the eye are the most perfect examples of such a surface.

Duration: Protensive Magnitude. One other aspect of sensation may be just mentioned, *viz.*, duration or, as Hamilton has called it, protensive magnitude. Every sensation has a certain duration, being either momentary or persistent for an appreciable time. This duration constitutes a third dimension or direction of quantitative variation in addition to intensity and extensity. That is to say, we may obtain more or less of a sensation in three ways by altering (*a*) the intensity, (*b*) the extensity or spread, or (*c*) the duration.

While, however, all sensations (as indeed all psychical states) exhibit this aspect of duration, they do not exhibit it with the same degree of precision or definiteness. Thus some sensations, as for example those of taste and smell, are less sharply defined in respect of their termination, and probably also of their commencement, than the sensations of the higher senses. In the case of sensations of touch, hearing, and sight, we appreciate much more precisely the protensive length or time-magnitude.

THE SERIES OF SENSES: TASTE AND SMELL.

Coming now to the senses in detail we see that they do not exhibit the same degree of definiteness or the same number of distinct presentative aspects or characters. We usually speak of taste and smell as the coarse or unrefined senses, because we cannot sharply discriminate their sensations, whereas hearing and sight are called highly-refined senses for an opposite reason. By attending merely to the number and fineness of the presentative differences we may arrange the senses in the following ascending order: taste, smell, touch, hearing, sight.

A detailed account of the senses, including, as it must do, a description of the peculiar physiological structures involved, would be impossible here. For this the reader can be referred to one of the easily-accessible text-books in Physiology or Physiological Psychology. We must content ourselves with a brief *résumé* of the psychical elements.

Sense of Taste. The sense of taste has its own specialised nerve (gustatory nerve) and end-organ (the gustatory flasks or buds contained in certain *papillæ*) which last has its special seat on a particular posterior area of the tongue and the soft palate. The proper stimulus to the organ of taste (sapid substance) is in every case one of the chemical substances known as crystalloids, which are either liquid or soluble in the mouth. This fact suggests that the immediate excitant of the gustatory end-organ is a chemical process. Hence taste is commonly spoken of as a chemical sense.[1]

The sensations of taste must be carefully distinguished from other sensations which are wont to accompany them.

In the first place then, true sensation of taste are commonly accompanied by and confused with organic sensations resulting from the stimulation of the nerve-fibres ending in the alimentary canal or œsophagus. Thus the sensations of relish and disrelish are not pure sensations of taste, but partly organic.

[1] Other stimuli, as electrical and possibly also mechanical pressure, are capable of calling forth the reaction of a gustatory sensation.

In the second place, sensations of taste must be distinguished from those of touch. The tongue is supplied by nerve-fibres and end-organs of touch proper, and the tip of the tongue is indeed finely discriminative of tactile stimuli. When we take food, whether solid or liquid, into the mouth, we obtain along with sensations of taste proper tactual sensations (including thermal), by which we know the size, shape, softness, grittiness, and temperature of the substance.

Lastly, sensations of taste mingle with, and are not easily distinguished from, those of smell. This is due to the proximity of the organs, and to the fact that many sapid substances give off odorous particles. The impairment of the sense of smell by a cold brings home to us how much sensations of flavour owe to the sister sense.

The common classification of sensations of taste proper is into four varieties, *viz.*, sweet, bitter, salt, and sour. This classification is not, however, universally accepted, some (as Wundt) adding alkaline and metallic, while others (as Valentin) would reduce the number to two, sweet and bitter. This shows that tastes do not lend themselves to a simple mode of classification.

This short account of the sense may suffice to show that it has a very limited value as a knowledge-giving sense. The position of the organ at the entrance of the alimentary canal, and the fact that only a certain number of substances, and these only under definite conditions, are sapid, suggest that the original and main function of the sense is to act as a kind of sentinel, testing beforehand the suitability of substances to be taken into the system as nutriment. By our artificial habits of life the range of sensation has been materially extended, but this has been done mainly in the interest not of knowledge but of enjoyment. It is only in restricted lines of observation, as chemical investigation, that this sense becomes an important aid in the discrimination and recognition of objects.

Sense of Smell. The sensations of smell, though apt, as we have seen, to be confused with those of taste, are in general sufficiently marked off from other sensations. This differentiation

is connected with the peculiarity of the organ involved. The end-organ in which the olfactory nerve terminates, and which is situated in a certain region of the nasal passage (*regio olfactoria*), consists of certain fine appendages that are acted upon in a way not yet fully understood by the odorous particles or effluvia borne thither by the current of air in the act of inspiration. Only such substances are odorous as exist in a gaseous form or are vaporisable under given conditions of temperature. The process of stimulation, being connected with the entering of the current of air, is intensified by a voluntary augmentation of the inspiration, as in sniffing.

As in the case of sensations of taste we have to mark off those of smell from others with which they are apt to be confused. Thus olfactory sensations are distinct from those organic sensations which are given by fresh or stuffy air, and which involve the nerves terminating in the respiratory cavity. Again, olfactory sensations must be distinguished from those mixed sensations which involve elements of tactual and common sensation, as for example those obtained by sniffing ammonia, snuff, and so forth.

The qualitative variety of odours seems to be far greater than that of tastes; yet the detection and classification of the elementary sensations is even more difficult here than in the case of the latter. Common language contains no words such as sweet, bitter, sour, which point to certain palpable distinctions of sensation answering to widely-distributed qualities in things. Such verbal distinctions as are found, as 'fragrant,' point to the concomitant effect of feeling. For the rest we only name sensations of smell by connecting them with particular objects or substances, as the rose, the lilac, the sea, sulphuretted hydrogen, and so forth.

The organ of smell occupies a position at the entrance of the respiratory cavity analogous to that of the organ of taste at the entrance of the alimentary cavity. And the original function of the sense may well have been that of a judge as to the quality of the air inspired as fitted or unfitted for the respiratory organ. This function has, however, in all the higher animals become a subordinate one. As we may see in the case of some of the lower animals, notably the dog, a fine olfactory sense may become

an important means of discriminating and identifying objects. In the case of man this knowledge-giving use of smell is greatly limited owing to the dulness of the sense, which dulness again is connected with the higher development of other senses, more particularly touch. Hence it is only a comparatively small number of objects and substances that we commonly recognise through the sense of smell. And of these again, it is more particularly those that produce a sensation of smell with a strongly-marked adjunct of agreeable or disagreeable feeling, as certain flowers, garlic, common gas, etc., which come to be customarily recognised and described by means of their characteristic odour.

SENSE OF TOUCH.

General Nature of Tactual Sense. The sense of touch, which has for its main element sensibility to pressure, from its higher degrees to bare contact, is in some respects the least specialised of the special senses It has for its end-organ no definitely circumscribed area of the peripheral surface as the retina. All parts of the skin are sensitive to pressure and give us corresponding sensations. Hence touch has been regarded by some as the fundamental mode of sensibility out of which the more specialised kinds have been differentiated.

In the case of *human* touch, however, we have to do with a highly-specialised form of this sensibility which is to be found definitely localised in certain regions of the skin, and particularly the more mobile organs, as the hand and pre-eminently the finger-tips. This speciality of function is connected with the presence in these parts of certain specialised structures or end-organs (the tactile corpuscles) which are compressed or made to expand as a body presses on the skin or is drawn over it, or, which amounts to the same thing, as the skin is pressed against or drawn over the body.

Tactual sensations are to be carefully distinguished from *common* sensations which are apt to combine with them. Sensations of tickling illustrate the tendency of the two to coalesce.

In the experience of being tickled there is a certain element of true tactual sensation, that of gentle contact, which is rapidly intermittent and which commonly shifts from one point of the skin to adjacent points. But the whole effect with its large element of feeling involves the action of the nerves of common sensation as well.

The fineness of the tactual sensibility proper is seen in the estimation of *degrees of pressure.*

It is found by experiment, first of all, that different parts of the skin are very unequal in respect of absolute sensibility, or capability of reaction on very weak stimuli. Goldscheider's researches go to show that true sensations of pressure are only obtained at certain minute spots ("pressure spots"), and that the degree of sensibility in different cutaneous areas varies directly with the number or closeness of these spots.

The second and more important mode of tactual sensibility is the discriminative sensibility to different degrees of pressure. Here definite results are difficult to obtain, owing to the fact that in ordinary cases where we estimate higher degrees of pressure, as in lifting a weight, the tactual sensibility is greatly assisted by the muscular sensations, to be spoken of presently. By supporting the arm or other part experimented on, and then successively applying different degrees of pressure, it has been found possible to some extent to measure the discriminative tactual sensibility of different regions of the skin. Among the results obtained is that the discrimination of pressure pure and simple is much less acute than when the muscular sensations co-operate. The inequalities at different dermal regions, as measured by the smallest difference discernible, correspond to some extent at least to known variations of tactual sensibility.

Touch, as already pointed out, is characterised by a fine appreciation of *extensive magnitude,* and of *local distinctness* of sensation. The discriminative sensibility to separateness of point or locality, which is measured by the smallness of the distance between two points, say those of a pair of compasses, just distinguishable as two, is found by the classical experiments of

Weber, aided by those of more recent investigators, to vary considerably at different parts. In general, it is finest in those regions, as the fingers and lips, which are known by every-day observation to have high tactual sensibility. It is much finer in the mobile parts, hands, feet, and lips, than in the comparatively fixed parts (the trunk). It is about twice as fine on the anterior as on the posterior surface of the fingers. In the former the minimum distance between the points sinks as low as ·2 of a millimetre (about ·008 of an inch). It falls off as we go from the extremities (fingers or toes) towards the trunk. This distinguishability of points is related to the frequency or closeness of packing of the nerve-fibres, but the exact nature of this relation is not understood.[1]

Differences of *quality* among sensations of touch are less numerous than those among sensations of smell. The most important, next to that of sensations of pressure and of heat and cold, are those of soft and hard, and rough and smooth; and in the case of these we have in part, if not altogether, to do with differences of intensity and of local character. Thus the contrast between hard and soft, as known purely by touch, is simply that between great and little pressure. It is obvious, moreover, that the terms are relative; the same object being called hard or soft in relation to different objects. The difference between smooth and rough, so far as dependent on pure touch, apart from movement, is connected with continuity and uniformity of pressure *at all points of the sensitive surface* in the one case, and discontinuity and inequality in the other.

Thermal Sensations. The sensations of hot and cold obtained by contact of different parts of the skin with bodies of various temperatures constitute a second main group of sensations usually included under the sense of touch. Sensations of heat and cold may arise in any part of the organism, and are in this

[1] Weber supposed that the area of the skin might be divided into sensation-centres, each of which, however, contains a number of nerve-fibres. Goldscheider suggests that the discrimination of two points is only possible when they touch two distinct 'pressure spots'.

respect closely allied to common sensations. More particularly they are experienced through variations in the temperature of the skin. In certain dermal areas they are finely distinguishable in their degree, and in this respect they constitute, like the finer tactual sense, a specialised mode of sensibility. Recent research shows that thermal sensibility is confined to certain 'spots' which are unequally distributed over the skin, but do not coincide with the pressure spots, and that some of these are sensitive only to heat, others only to cold.

The sensations of temperature received by way of contact of bodies with the skin present a clearly-marked contrast of quality, *viz.*, that of hot and cold. As is well known, the sensations of extreme heat and extreme cold tend to approach one another. Between these extremes many degrees of hot and cold are distinguishable. In this way we get a scale of thermal sensations analogous to that of rough and smooth, and hard and soft, with a neutral or indifferent point, known as the zero-point, in the median region of the scale, which appears to be related to the normal temperature of the part of the skin stimulated.

The discrimination of temperature, like that of pressure, varies considerably at different parts of the skin. These variations do not run parallel with those of sensibility to pressure. Since, moreover, the normal temperature of the skin varies at different parts, *e.g.*, at the finger-tips and the inside of the mouth, the zero-point is not the same for all dermal areas.

The sensations of hot and cold are known to be highly subjective or relative. Thus they vary with the changing temperature of the part affected. Weber showed that if the hand be held in water of the temperature 54·5° Fahr. and then plunged in water 64·4°, it will feel this last to be hot, whereas if the hand had been put into the second at the outset it would have felt it to be cold.

Value of Sense of Touch. Our examination into the sensations of touch shows us that this sense is capable of yielding us a variety of finely-graduated differences. In spite of the few qualitative dissimilarities, as compared with those of the higher senses, hearing and sight, it furnishes us with an exact

knowledge of some of the more important qualities of bodies. This result depends first of all on its fine discrimination of degrees of pressure, and then on its clear separation of local characters. Finally, it may be observed that owing to the sharp definition of tactual sensation with respect to commencement and termination we may compare them in rapid succession, as we are unable to do in the case of sensations of taste and smell. This knowledge-giving value of touch is further increased by the constant co-operation with tactual sensations proper of the muscular sensations to be spoken of presently. There is little wonder, then, that from the time of Aristotle downwards touch has been regarded as a sense of the first importance, and that more than one writer should have attributed man's intellectual superiority over the lower animals in no small measure to his possession in the hand of so delicate and serviceable a tactile organ.

Hearing.

Characteristics of Auditory Sensations. Hearing and sight are universally recognised as the highest senses. Here we see for the first time a perfectly differentiated complex organ. The peculiar form of the stimulus (air or ether vibrations) allows of the action of bodies on each of these organs at considerable distances. And just as they stand alone in respect of the delicacy and complexity of the physical apparatus involved, so they are marked off from the other senses by the rich and delicately graduated variety of their sensations.

The peripheral organ, the ear, consists of the end-organ proper, that is, the special structures in which the nerve-filaments terminate, and a mechanical apparatus for collecting and bringing to bear on these the air vibrations which form the stimulus.

Sensations of sound exhibit numerous and definite differences of *intensity*. In the case of sounds of moderate intensity we can recognise a distinction of loudness or strength according as the stimulus increases by the addition of about one-third of its strength (amplitude of wave).

The superiority of hearing to the senses already considered is most plainly evident in respect of the *qualitative* differences of the sensations. The ear presents to us a rich variety of sensuous quality. All ordinary sounds yield complex sensations; and the ear, unlike the senses of taste and smell, is capable of easily distinguishing (within certain limits) the several constituent parts of its complex impressions. This power of analysis, aided by objective research, enables us to classify the sensations of sound with something like completeness.

The first division of sounds is into musical sounds or tones and non-musical sounds or noises This distinction is known to be connected with a clearly-marked difference in the mode of stimulation. Musical sounds depend on regular or periodic vibrations, noises on irregular or non-periodic vibrations. Whether, in addition to this, different peripheral structures are involved in the distinction, is not quite certain.

(A) **Musical Sensations.** The most important characteristic of a tone is what we call Pitch or height. Every musical sound or tone has its particular pitch, without which it would cease to be musical. Differences of pitch constitute the most important qualitative differences among musical sensations. There are as many distinct varieties of musical sensation or tones as there are distinguishable pitches or heights. These differences are known to depend on the rate of vibration of the medium (the atmosphere). A tone of high pitch corresponds to a rapid series of vibrations, one of low pitch to a slow series. Such differences in the external stimulus may be supposed to cause corresponding differences in the nervous excitations involved.[1]

Although our modern scale recognises only discrete tones separated by at least a semitone, the ear can distinguish much finer differences of pitch. The scale of pitch is analogous to that of intensity in that there is a lower and a higher extreme beyond

[1] There is some ground for supposing that sensibility to tone or pitch is connected with a special system of end-organs, *viz.*, the fibres in the basilar membrane of the cochlea of the ear. These seem to be so constructed as to respond to series of vibrations of unequal rapidity.

which any further slowing or quickening of the vibrations results in the loss of all distinct impression of pitch, and further in that within these extremes the least noticeable change of pitch-quality corresponds roughly with one and the same proportionate increase or decrease of the stimulus in respect of rapidity.[1]

Individuals are known to vary greatly in their discrimination of pitch, and it is this which determines the musical capacity of the individual. Some persons are called 'note-deaf' because they do not distinguish tones even when separated by a semitone interval and more. In contrast to these some who have a fine musical ear can detect so slight a difference of pitch in certain parts of the scale as to be able to distinguish 200 tones in an octave.

In addition to this scale of pitch-quality, there are the differences known as timbre or 'clang-tint'. These are the qualitative differences in sensations of tone answering to differences in the instrument, as the peculiar 'colour' of the tones of the piano, the violin, the human voice. These differences have been explained by Helmholtz as due to differences in the mode of combination of the several elementary tones ('partial tones') which together constitute what appear to the untrained ear the simple tones, but are best described as the clangs, of musical instruments.

Lastly, in considering musical sensations reference must be made to the important fact of Harmony or consonance and dissonance among tones. This is mainly a difference of feeling, that is, of an agreeable and disagreeable effect. Yet there is a difference of presentative character involved. In the case of consonant and dissonant tone-groups alike the ear can much more readily distinguish the constituent tones than in the case of single clangs. Hence the effect is commonly recognised as a complex sensation. It may be added that dissonance involves, as a peculiar qualitative element, a rough grating character the absence of which gives the *smoothness* to a musical harmony.

[1] The range of pitch, which varies, especially at the upper extreme, with different individuals, extends from about 16 to 40,000 vibrations per second.

Non-musical Sensations: (B) Noises. In addition to this wide range of musical sensation the ear distinguishes a vast number of non-musical sounds, the characteristic 'noises' of different substances, such as the roar of the sea, the rustling of leaves, and the crack of a whip. The peculiar character of a noise depends on a number of variable circumstances. One of these is the extent and number of dissimilar stimuli acting on the organ, as in the effect of the murmur of the sea or of a crowd. Again, the mode of variation of the sound from moment to moment is often characteristic, as in the noise of a saw or of a passing vehicle. But the precise nature or composition of noises is still but imperfectly understood.

Among noises must be included the important group of sounds known as *articulate* or language sounds. The peculiar character of a *k* or *s* sound is precisely analogous to that of a sound of which we commonly speak as a noise The fact that language sounds are radically distinct from musical sounds is illustrated in the familiar observation that a person may have a good natural ear for the one without having a like discriminative sensibility for the other.[1]

At the same time, tones and noises are not absolutely distinct. Just as ordinary clangs, say those of a violin, have an accompaniment of noise, so most noises involve elements of tone, and owe a part of their character to this circumstance (*e.g.*, the roar of the sea, or of a crowd). This remark applies, among others, to articulate sounds. The researches of Helmholtz go to show that the several vowel sounds are characterised by peculiarities of timbre and thus approximate to true musical sounds.

Value of Sense of Hearing. Enough has been said to show the high degree of refinement characterising the sense of hearing. The delicate and far-reaching discrimination of quality just illustrated is, moreover, as we shall presently see, aided by an exceptionally fine discrimination of duration, which allows of a

[1] This suggests that noises and musical sounds involve a separate terminal apparatus (end-organs) in the ear, a conclusion which is probable on other grounds.

nice discrimination of sounds in rapid succession. In this way we are able through the sense of hearing to acquire a good deal of exact information, as well as a considerable amount of refined pleasure. The delight of music sums up the chief part of the latter. The former is most strikingly illustrated in the wide range of knowledge derived by way of that system of articulate sounds known as language.

As a set off against these advantages, it must be borne in mind that hearing is sadly lacking in respect of extensity and distinctness of points. Even if sensations of sound have extensity proper (a disputed point) the appreciation of this is very imperfect. The very structure of the organ and the way in which the stimulus is applied appear to exclude a definite discrimination of extensity and number of points such as we find in the case of touch and sight.

SIGHT.

Characteristics of Visual Sense. The sense of Sight is by common consent allowed the highest place in the scale of the senses. The stimulus, ether vibrations, greatly exceeds in point of subtlety the stimuli which (under normal circumstances) operate in the case of the other sense-organs. It is owing to the nature of this stimulus, moreover, that the sense of sight is capable of being acted upon by objects at enormous distances, as the heavenly bodies. Conformably to this subtlety of the stimulus, we find that the structure of the eye appears to exhibit a yet greater delicacy than the organ of hearing. This applies both to the end-organ itself, the retina with its several layers, more especially the finely-moulded structures, the rods and cones, in which the fibrils of the optic nerve probably terminate, and also to the optical apparatus, the lens, and other contents of the eye-ball, by means of which the luminous stimulus is brought to bear on these.

The scale of *intensity* in the case of visual sensations is obviously a very extended one. It answers to all distinguishable degrees of luminosity, from the brightest self-luminous bodies which we are capable of looking at without temporary blinding

down to the objects which reflect a minimum of light, and are known as black. The discrimination at its best in the medium parts of the scale answers to a change of from about $\frac{1}{120}$th to $\frac{1}{190}$th in the strength of the stimulus. The eye's capability of recognising at a glance the particular nature of an object, as well as of discriminating a multitude of unlike objects in a scene, rests in part on this delicate discriminative sensibility to degrees of light.

Colour-Sensations. The stimulus of the eye, like that of the ear, varies according to the rapidity of its vibrations. The analysis of solar light into its constituent rays in what is known as the prismatic spectrum separates the different kinds of rays, that is to say, those of different rates of oscillation. The red rays at one end of the spectrum are the slowest, making about 456 billion of vibrations per second, whereas the violet rays at the other extremity make about 667 billions. These variations in the rapidity of the vibrations occasion (within certain limits) differences in the quality of the resulting sensations. In this way we obtain a scale of chromatic quality resembling that of pitch in the case of musical sensations. The two scales resemble one another further in being series of *gradual* changes, and in the limitations of the specific qualitative effect at each extremity (violet and red rays).

While there are these points of analogy between the scale of colour-sensations and of pitch-sensations, the two differ in important respects. To begin with, the quality of the colour-sensation does not change continuously in exact correspondence with the changes of the stimulus, as in the case of tone-sensations. In some parts of the spectrum considerable changes in the rate of vibration occur without producing any appreciable effect on the sensation. Hence we cannot speak of a colour-continuum in precisely the same sense as we speak of the tone-continuum. Again, the series of colour impressions, instead of assuming the form of a straight line, rather assumes the form of a bent or curved line. The extremities red and violet seem to approach one another. Indeed, if the extreme rays are combined we have a sensation, that of purple, intermediate between the terminal sensations red and violet.

In addition to this series of colour-sensations we have for any given colour a scale of purity or *saturation*. A red or a green,

for example, may be more or less whitish, or on the other hand pure *as a red* or *as a green;* so that any colour will present a series of changes according as we vary the proportion of white light to the special kind of light. In certain cases a difference in the degree of saturation is commonly spoken of as a difference of colour. Thus what we call pink is simply a whitish modification of a purple.

The several kinds of rays when combined, as in sunlight, produce the impression white. The same sensation may result from combining different pairs of the several varieties of light in certain proportions. Such pairs of rays, and the accompanying sensations of colour, are spoken of as *complementary* one to another. Thus blue and yellow, purplish red and green, are complementary. If we add purple to the spectrum series and represent this by a circle, we find that any two kinds of light standing opposite to one another or at the extremities of one diameter are thus complementary. Such complementary colours are commonly said to go well or to harmonise well with one another.

The many and intricate phenomena of colour-sensations have given rise to various physiological hypotheses respecting the structure and mode of activity of the retina. Among these the most popular is known as the Young-Helmholtz theory. According to this the nervous elements of the retina consist of three kinds of fibre. These are acted upon more especially by the red, the green, and the blue or violet rays respectively. These three colours would thus be in a peculiar sense elementary colour-sensations, while other colours, as purple, bluish green, together with white, would be composite. This theory is, however, not universally accepted.[1]

In addition to these numerous differences of intensity and quality, the sensations of sight are characterised by *a fine discrimination of points and of extensive magnitude.* And it is

[1] Thus Hering would propose four fundamental colour-sensations, *viz.*, green and red, blue and yellow, to which he adds black and white, each of these pairs being supposed to correspond to two opposite functions of the same visual substance.

this circumstance, together with another to be spoken of presently, which gives sight so distinct a superiority to hearing as an intellectual or knowledge-giving sense. Thus it is through the fine distinctions in number of points and extent of impression that we are able to estimate so nicely by the retina the precise form and the magnitude of a visible object. The fineness of this discrimination is, like that of colour-discrimination, greatest in the central region, the area of perfect vision, and falls off towards the periphery.

Movement and Muscular Sense.

Definition of Muscular Sense. Sensations are supplied us, not only by way of the familiar sense-organs when stimulated by external forces, but also by our own muscular actions. Such actions are important elements in conation, and as such will have to be spoken of by-and-by. Here we are concerned with them merely as contributing presentative elements, analogous to those of tone, colour, etc., which enter into our intellective processes.

Muscular sensations may be defined as those characteristic modes of consciousness which are specially connected with the stimulation and the contraction of the voluntary muscles, as those of the limbs, the eyes, the vocal organ. If, for example, I flex my arm or turn my eyes to the right, or exert my vocal and respiratory organ in the act of shouting, I have a peculiar sensational consciousness by means of which, independently of any *mediately* resulting changes of tactile, visual, or auditory sensation, I know that I am "energising" and also something respecting the special character of this exertion. Muscular sensations are thus, though closely conjoined with sensations of the special senses, more particularly those of touch and of sight, sensations *sui generis*. They are marked off from other sensations as *active* from *passive* states.

These sensations, though in the adult consciousness apparently simple, are in reality highly complex. They probably consist in part of the immediate psychical concomitants of the central initial stage of the *efferent* nervous process, or process of motor

innervation, which have been called sensations or less properly 'feelings' of innervation. At the same time, it is now certainly known that these sensations of innervation are by no means the only factor in the muscular sense. A large part of our muscular experience, as when we move a limb, is made up of the sensational results of *afferent* nervous processes. That is to say, our muscular, like our other sensations, are, in all normal cases, partly the product of a stimulation of peripheral organs, as the tendons, the joints, the skin (which is stretched and folded by movement), and possibly the muscles themselves, when this is transmitted to the brain. At the same time, the precise part played by these factors in the muscular sense is still a matter of uncertainty.[1]

Varieties of Muscular Sensations. The action of the voluntary muscles gives rise to a considerable variety of sensational experiences. To begin with, it is evident that since our (voluntary) muscular system, unlike a special sense-organ, extends over the whole area of the body and certain of its cavities, and is made up of very unlike organs or structures, differences of peripheral structure will produce differences in the psychical concomitant. A difference of calibre, as between the muscles of the leg and of the fingers, will affect the *quantity* of the muscular sensation, making it more or less massive or extensive; not only so, difference in the attachments of the muscles and adjacent tissues will modify the *quality* of the accompanying sensation in various ways. Thus the psychical correlative of the action of the muscles of a limb will be "coloured" by the articular sensations connected with the pressure of the joint-surfaces, also with the tension of the skin, elements which are wholly or in part wanting in the case of the ocular muscles.

Another class of differences in our muscular experience is connected with dissimilarities in the mode of action of the muscles

[1] Some, as Dr. Bain, hold that they are essentially central in origin, being the accompaniment of the outgoing efferent process of motor innervation. The more recent view, as held by W. James and others, is that they are wholly peripheral in their origin. It seems impossible as yet to decide between these contending views.

engaged. Here we may confine ourselves to those groups of muscles which are of chief importance as a source of knowledge, *viz.*, those by which our limbs are moved.

In considering these varieties of muscular experience we may conveniently set out with the comparatively simple experience answering to a momentary position of a limb. We may then consider the more prolonged experience of movement itself, and finally take up the complicated case which arises when movement is impeded by the presence of an obstacle. Thus we have (1) Muscular Experience without Movement: Sensations of Position; (2) Experience of Movement, and (3) Experience of Impeded Movement.

(A) **Experience without Movement: Sensations of Position.** The experience answering to a particular position of the limb may arise either passively or actively. A person may support my outstretched arm, or I may myself hold it out. The former situation, position passively induced, is obviously the exceptional one, at least in later life. It is complicated by the skin-sensations of pressure, while, on the other hand, it does not involve the characteristic action of the muscles as made known in active consciousness or sense of exertion. We may then dismiss this case, and confine our attention to the normal experience of actively-induced position. It follows from what has been said respecting the probable constituents of the muscular sense that every separate position of a limb, say the arm, will have its own distinguishing psychical concomitants. These will consist in part of *central* constituents, for the relative amounts of innervation in the motor organs engaged, that is to say, the group of muscles together with their antagonists which keep the limb in a particular position, will vary with that position, *e.g.*, holding the arm horizontally, vertically. The chief distinguishing feature will, however, be the *peripheral* factor, *viz.*, the peculiar sensations arising from the relative position and pressure of the joint-surface, as also those connected with the peculiar state of tension and compression of tendons, adjacent skin, and possibly the muscular fibres themselves.

(B) **Experience of Movement.** In the case of movement we have, it is evident, a prolonged experience, made up of a continuous *change* or succession of sensational accompaniments. This feature of change is essential and characteristic. Movement is not merely that by which we bring about indirectly changes in our surroundings, *e.g.*, the visible scene, it is itself an experience of change. It is reasonable to suppose that the delicacy of our sense of movement, which in the case of certain movements, *e.g.*, those of the eyes, is very great, depends on the fineness of our discrimination for these successive sensational differences.

In considering these experiences of movement it is important to distinguish them, so far as we are able, from our *perception* of movement as occurring in space, which, as we shall see, comes later. These primordial experiences of movement are unattended with any clear consciousness of *spatial* relation, such as definite position of the limb at a particular point of space, and change of the position in a given direction Indeed, all clear space consciousness is developed *as the result* of these first motor experiences.

In order to explain the genesis of these perceptions of space, *viz.*, position, distance, etc., by help of this motor experience, it seems necessary to assume two presentative characters in this experience: (*a*) that answering to direction of movement, and (*b*) that answering to range of movement. It may be assumed that the action of one group of muscles will differ in its psychical concomitant from that of another. In this way the movement of the right arm and of the left would affect our consciousness differently. Movements of the same arm in different directions would, for a similar reason, have different psychical concomitants. Thus the flexing and extending of the fore-arm would differ in consequence of the difference in the *order of succession* of the several groups of sensations attending the changing positions of the limb.

In the second place, all movements will differ on their conscious side according to other characters which have to do with their range or *extent*. To begin with, then, the motor experience, like passive sensation, varies according to its *duration*. This is an important circumstance, for, as we shall see, it is partly by

help of this feature of duration that we come to know how much movement we have carried out in any given case.

Again, our motor experience varies according to the *velocity* of the movement. Thus we have one kind of muscular experience in moving the arm or the eye slowly, another in moving it rapidly. This sense of velocity is, it is manifest, connected with the rapidity with which the successive phases of the movement on their conscious side succeed one another.

Duration and velocity would in themselves constitute sufficient sense-data for reaching a perception of range or extent of movement. In addition to duration and rapidity of change there are other data for forming a perception of distance in the scale of sensational differences answering to successive stages of a movement. Thus a flexing movement of the arm *carried to the extreme point* is accompanied by characteristic cutaneous and other constituents of the muscular sensations which would serve as signs of range or amount of movement.

A word in concluding this account of our sensations of movement on the difference between the active and the passive experience. The latter is illustrated when we have our arm flexed by another person. Here the characteristic of the active consciousness is wanting. There is no sense of exertion, such as attends our self-initiated movements, so that the movement is not regarded as our own. At the same time it is clearly a motor experience. The sensations connected with the altering positions of the joints and the skin are similar to those which attend active movement. It is possible, too, that sensations due to the contraction of the muscular fibres are also involved. Hence the explanation of the surprising fact recently brought to light by experiment that we can estimate the extent of a movement of the arm almost as well when this is passively, as when it is actively induced.

(c) **Experience of Impeded Movement: Sense of Resistance.** The remaining variety of muscular experience is that which arises when our impulse to move is counteracted by some obstruction; an experience which has been marked off as "dead strain" (Bain) and as consciousness of resistance. This

experience may be given either by our own body, as in pressing the arm against the side, the chin against the chest, or by foreign objects. It is these last which are commonly thought of in connexion with obstructed movement. As examples of this experience of resistance we may take pressing against a heavy body, supporting or lifting a weight, pulling or dragging an object.

Here it is evident muscular sensations are complicated by ordinary tactile sensations, *viz.*, sensations of pressure. The experience is, indeed, made up of a muscular and a tactile experience, the latter being dependent on and varying in degree with the muscular exertion or strain. As we shall see by-and-by, it is by means of this complex experience varied in different ways that we come to perceive the fundamental qualities of material things, *viz.*, impenetrability in its various modes, hardness and softness, density and rarity, etc., as well as weight and inertia, *i.e.*, immobility and momentum.

Active Sense: Touching, Seeing, etc. The muscular sense, though sharply distinguished from passive sensation in its character and mode of production, is always conjoined in our experience with such passive sensation. All sensory stimuli tend to excite some amount of muscular action, and it is probable that all our so-called "passive" sensations are in reality complicated by the concomitant of this muscular action. Moreover, since all our sense-organs are supplied with muscles by the action of which they are moved (wholly or in some of their parts), it follows that each class of special sensation will have a well-marked motor concomitant Thus the movements of the tongue enter into active tasting, those of the nostrils and respiratory organs into active smelling or sniffing, while certain muscles of the ear, and, to a larger extent, those of the head, co-operate in active hearing or listening.

It is, however, in the case of the two most highly mobile sense-organs, those of touch and sight, that we see the co-operation of muscular action most plainly manifested. Touching and seeing or looking are pre-eminently active processes involving movements of the organs concerned, as stretching out the hand,

running the fingers over a surface, directing the eyes to a point. This co-operation of muscular action with passive sensation is known as Active Sense.

The service thus rendered by muscular action to the special senses is a complex one. In the first place, it is evident that the movements of a sense-organ result in an *increased number or range* of passive sensations. Just as the mobility of an insect's antennæ enables it to have many more impressions of touch than it would have if the organs were fixed, so the mobility of the human arm, hand, and fingers greatly extends the range of our tactile impressions. By such movements we are able to bring the most sensitive part of the organ, *e.g.*, the finger tips, the area of perfect vision on the retina, to bear on the several portions of a wide area of objects.

A second advantage closely connected with this is the introduction of *change* of impression. The importance of this will appear when we consider the bearing of change or contrast on the distinctness of our sensations Movement introduces change in more ways than one. Thus when a person moves his eye over the objects constituting his field of vision, the shifting of the several luminous stimuli to new retinal elements serves to strengthen their effect, that is, *to render the sensations more vivid and impressive than they would be if the eye were fixed.* Of still greater importance is the change which is secured by means of rapid movement between successive impressions received by way of the most sensitive part of the organ. It is by transferring the fingers rapidly from one surface to another (*e.g.*, from a rough to a smooth, from a cold to a warm) that the corresponding qualities are nicely distinguished. Similarly, it is by passing the eye quickly from one colour to another that the finer discrimination of colour is carried out.

But this increase in the range and the comparability of our passive impressions is only one part of the gain resulting from the mobility of the sense-organs. A third and no less important service rendered to the special senses by their muscular apparatus is *the addition of the muscular experience itself* which accompanies

the workings of this apparatus. This experience, as we shall see by-and-by, supplies the two senses of touch and sight with a specially complete means of ascertaining the position of objects in space; and, further, enables touch to inform us of the fundamental properties of material bodies.

(B) ELEMENTS OF FEELING.

Primitive Affective Phenomena. In this general account of the elements of mind a brief reference must be made to the other two groups of elementary psychical phenomena, *viz.*, feelings and movements regarded as active or conative phenomena.

With respect to affective elements, that is to say, simple modes of agreeable and disagreeable feeling, it is evident that, like presentative elements of sensations, they are given as the immediate psychical concomitants of nervous stimulation, and are predetermined by the very structure of the child's nervous system Thus we find them, under normal circumstances, experienced within the first weeks of life. They are, moreover, closely connected with presentative elements or sensations. As examples of these affective elements or Sense-feelings we may take the familiar pleasures and pains of the bodily or organic life, such as the recurring cravings and satisfactions of appetite, the feelings connected with changing temperature of the body, with digestion and indigestion, with obstruction and furtherance of respiration, etc., with the exercise and fatigue of the muscular system, and, lastly, with the activities of the special senses, *e.g.*, the sensations of sweet and bitter in taste, of smooth and rough in touch. A fuller investigation of these sense-feelings and of their precise relation to the presentative elements will have to be made later on, after completing our account of the growth of mind on its intellectual side.

(C) ACTIVE ELEMENTS: PRIMITIVE MOVEMENTS.

Primitive Conative Phenomena. In addition to sensations, and the feelings which are so closely conjoined with these,

we have as primordial psychical phenomena certain active tendencies. The structure of the nervous system, as already set forth, prepares us for the fact that movement is proper to the child, and that it is from the first excited reflexly, that is, in response to sensory stimulation. We may instance the movements of the limbs, head, etc., in response to tactual, auditory, and other stimuli. These movements, as we shall see later, include those by help of which attention to sense-impressions, *e.g.*, turning the eyes or head in the direction of an object, is effected. Certain primitive movements, moreover, may take their rise independently of sensory stimulation and through some process of immediate central excitation, as when a baby moves its limbs on waking.[1] As will be shown later, it is these movements, *regarded as modes of active consciousness*, which enable us to explain the growth of voluntary action.

(D) Primitive Complex Arrangements.

Primitive Conjunctions of Elements: Instinctive Dispositions. The original data of mental development include not merely certain elements but certain organically conditioned *modes of connexion* among these. As an example of these we may take the complication of passive with muscular sensation, which will be more fully illustrated hereafter, and which has its organic basis in the continuity of the sensory and motor tracts. There is some reason to suppose, further, that the conjunction of sensations belonging to disparate senses, *e.g.*, those of touch and sight, which, as we shall presently find, combine in our common perception of objects, is aided to some extent by primitive nervous arrangements which would favour the conjoint action of the corresponding cortical centres.

In the regions of feeling and conation we shall find other examples of such primitive connexions. Thus in what is called an emotion we have a feeling prolonging itself by secondary corporeal effects, as the palpitation which accompanies fear, which

[1] *Cf.* above, p. 23, footnote.

effects result from certain primitive nervous connexions. So, too, in early movements we find certain uniformities in all children alike, such as the alternations of forward and backward swing of the leg, which point to the existence of original dispositions growing out of the congenital formation of the nerve-centres. Such arrangements are known as Instinctive Dispositions.

The Range of Instinct in Man. The precise range of such primitive psycho-physical arrangements in the case of man is very uncertain. It is a commonplace in biology that the higher we go in the zoological scale the less is the individual's life mechanically predetermined and the more subject to the educative agencies of his experience. Thus, in man the range of instinct is far narrower than in the lower animals. He cannot walk just after birth, as the calf can do; still less can he adjust movements to definite modifications of visual impression, as the newly-hatched chick is able to do. The human nervous system is eminently plastic, and the large bulk of its arrangements or connexions have to be formed in the course, and by the help, of individual experience and education.

At the same time the advance of psychological analysis in recent years, aided by a more extended and more exact observation of the infant mind, has led to the conclusion that in man too the range of instinctive disposition is much more considerable than has been supposed. Even in the case of actions which have to be acquired and rendered perfect by a process of learning, the presence of a co-operant instinctive factor is now recognised. Thus the child's use of his limbs, and of his vocal organ, is aided and expedited by such an instinctive or connate factor.

All such instinctive or connate tendencies must be regarded as given in organic connexion with the primitive constitution of the nervous centres. Here the psychologist has been wont to pause. To trace back a psychical phenomenon to a primordial instinct is, according to this view, to have reached the goal of psychological analysis. The modern doctrine of evolution, however, enables us to go further, and to trace out to some extent the antecedents of such a connate endowment.

Origin of Instinct: Heredity. Connate or congenital endowments are either specific, that is, common to all members of the human species, or variable and individual. Our various normal sensibilities are examples of the former; native individual character is an example of the latter

All congenital endowments arise in one of two ways: either as the result of those unknown influences which cause an individual to vary and differ from his ancestors, and which we call accidental variations; or as the result of the conservative force of heredity. All specific endowments are of course due to the latter agency. The normal human brain, with its correlated psychical capacities, is, like the human organism as a whole, the result of the hereditary transmission of specific or typical characters from progenitor to offspring. Individual endowments, *e.g.*, a trick of manner, though in many cases referrible in the present state of our knowledge only to the causes which produce individual variation, are in numerous instances traceable also to the action of heredity. It has long been observed that peculiar physical and mental traits are apt to reappear in the successive generations of a family.

Going back a step further, we may ask how the ancestor first came by the trait which he is thus able to transmit. If it was not always existent it must at some moment have been come by. There are two supposable ways in which it could have been attained: either it was the product of the ancestor's own experience, and so an "acquired character," or it was an original peculiarity of his organism or a congenital character An example of the first would be the transmission from progenitor to offspring of special intellectual power or skill, acquired by long and exceptional training; an illustration of the latter would be the reappearance of a congenital eccentricity of bodily carriage or gesture. Although the possibility of the first is now disputed, it is probable that both factors concur in the production of what are commonly known as hereditary phenomena.

According to Mr. Spencer and other evolutionists, transmission of acquired character is a chief factor in the evolution of the

human race, since it secures the slight improvement of each successive generation by the inheritance of the fruit of the exertions of its predecessor. If we adopt this view we may argue that every sound child born in a civilised community brings with it into the world an *outfit of instinctive tendencies or dispositions constituting the natural basis of the civilised and moralised man.* These tendencies, being comparatively late in their acquirement by the race, are necessarily inferior in strength to the deeper-seated and earlier-acquired impulses of the nature-man; yet they form a valuable support to all educational effort.

REFERENCES FOR READING.

A popular account of the several senses is given by Prof. Bernstein in his *Five Senses of Man.* A detailed exposition of sensation is contained in Prof. Bain's *Compendium of Mental Science* (book ii.). The results of more exact experimental research into the properties of sensation (psycho-physical experiment) can be studied in Prof. Ladd's *Elements of Physiological Psychology* (pt. ii.), or his smaller *Outlines*, chaps. x.-xii.

CHAPTER V.

MENTAL ELABORATION: ATTENTION.

Psychical Elaboration. Having briefly surveyed the primitive elements of our psychical life, we proceed to study the processes by which these are elaborated into the several later products, ideas, thoughts, complex emotional states, etc. These processes of elaboration, though depending on physical processes, *viz.*, certain arrangements in the 'psychical centres,' will have to be studied in the main on the subjective or conscious side

In analysing the process of psychical elaboration into its constituent processes, we shall be chiefly concerned with *intellectual* development, or the elaboration of ideas, thoughts, etc., out of sensations. It is here that we can most plainly see into the nature of psychical elaboration; and it may be expected that the development of feeling and of volition will exhibit closely analogous processes.

Attention as a Factor in Elaboration. The first and simplest phase of the process of elaboration is that reaction which serves to make a sensation a prominent and for the moment a supreme element in the stream of consciousness. This reaction is known as Attention.

Now attention is a phenomenon of the *active* phase of mind, and as such can only be adequately studied under the head of conation. At the same time, seeing that it is present in a measure in all fully-developed and distinct phenomena of conscious life, we must make a preliminary study of it at the outset. Here, however, we shall be concerned with the process mainly as a *determining* factor. The understanding of it *as itself determined*,

more particularly by feeling and conation, will only be possible after a study of these two domains of phenomena.

Grades of Consciousness: the Sub-Conscious. In taking up the subject of attention we are confronted with a fact hitherto ignored, *viz.*, *that psychical phenomena present themselves in unequal degrees of definiteness or distinctness*, or to express the fact otherwise, that they may be more or less prominently present in consciousness, or may take on more or less of the conscious attribute. This fact must now be set forth and illustrated.

Our mental life consists of different levels or heights, according to the degree of consciousness involved. The lowest level is that of indistinct consciousness. This includes all that mass of vague sensation, thought, impulse, and feeling which forms the dim background of our clear mental life. At any moment we may become aware of the presence of such vague elements, as bodily sensations, half-developed recollections, obscure and undefinable feelings. This dim twilight region may be marked off as that of the Sub-conscious.

Unconscious Psychical Processes. The relations of consciousness to the sub-conscious have given rise to much discussion. According to some writers there is a region of unconscious mind, which does not enter into our conscious life *in any measure*.[1] This region is apt to be identified by physiologists with those central nervous processes which appear to have no distinct psychical concomitant. Thus it has been supposed that in addition to the actions of the lower nerve-centres certain actions of the psychical centres themselves ("brain-reflexes," "unconscious cerebration") may be so feeble or so rapid as not to induce any psychical concomitant. From a psychological point of view, however, a nervous process merely as such does not come within the view of the psychologist at all. It is only as it has some rudiment of sensation or other properly psychical phenomenon attending it that it concerns the student of mind. Now it is presumable that there are psychical equivalents of many nervous processes connected with the lower regions of life (vegetative functions) which never, or only under exceptional circumstances, distinctly emerge in consciousness. At the same time they

[1] The term Sub-conscious is sometimes used for this region. It is, however, better applied, as above, to the outer and obscurer zone of consciousness.

enter into and colour our mental life taken in its widest extent. Thus, as we shall see, the so-called organic sensations connected with the varying condition of the organs of digestion, circulation, and so forth, which we hardly ever make the object of a special and separate attention, are the main constituent in what we call tone of mind or 'spirits'.

Again, some, as Sir W. Hamilton, urge from a strictly psychological point of view that we must postulate "unconscious mental modifications," *i.e.*, unconscious sensations, thoughts, and so forth, in order to account for the phenomena of distinct consciousness. Thus they say that we cannot explain the revival of a sense-presentation, *e.g.*, a colour, under the form of an image without assuming the continued existence of the presentation as an unconscious mental state or content during the interval between its original occurrence and its revival. Such a supposition would doubtless aid us in explaining, by help of properly psychical processes, obscure facts of our mental life. But it is open to the grave objection that the idea of a *mental* phenomenon, existing *out of all relation* to the conscious life of the moment, is self-contradictory. This difficulty seems overcome in a measure by saying that all psychical phenomena lying beyond the confines of clear consciousness are constituents of the vague consciousness or sub-consciousness.

In thus distinguishing clear from vague consciousness we must not confuse the former with self-consciousness. This last is, as we shall see, a product of mental development, and is by no means always present in the distinctly conscious psychoses of mature life.

General Function of Attention. Since attention is the process by which obscure half-formed products of our consciousness take on clearness and completeness it must, it is evident, play an important part in the economy of our mental life. It serves to bring about an orderly arrangement and a simplification of this life. The process of attention is selective, and helps to give prominence at the moment to some particular mental content. In this way the successive movements of attention, so far as they enter into our psychical processes, tend to reduce the multiplicity of sensuous and other elements which present themselves to *a single thread of connected events* which we can afterwards more or less completely retrace.

While, however, we thus at the outset assign so unique a place

and so prominent a function to attention, we have to admit that in all its more energetic degrees it is but an occasional ingredient of consciousness. Not only does the region of organic life but rarely become the object of such close attention; the higher plane of conscious life itself, including sensation, voluntary movement, and the intellectual processes, involves less and less of the concentrative element *as these processes recur and grow familiar.* In this case, as was pointed out above, the nervous mechanism with which the whole of our mental life is correlated comes into new prominence.

Definition of Attention. Attention may be defined as mental activity immediately resulting in a raising in point of intensity, completeness, and definiteness of certain sensations or other psychical phenomena, and a corresponding lowering of any other simultaneously-presented sensations, etc. Thus in attending to a particular voice in a chorus I raise this impression of sound to its full intensity, and render it distinct, and in so doing cause other sounds to be comparatively faint and indistinct.

It is implied in this definition that attention has its direction determined by a particular psychical content, for example, the impression of a bird flying across the visual scene. A content when thus reinforced by attention is said to be its 'object'.

Objects of attention are either sensations, and their combinations, sensation-complexes,[1] or what we call ideas or representations, *e.g.*, the idea or mental image of a face. In this preliminary account of attention we shall confine ourselves as far as possible to the earlier and "outer" direction of attention, *viz.*, attention to sensations. The process of "inner" attention, or attention to ideas, will be dealt with more fully hereafter.

In its earliest and simplest form attention is to be conceived as a kind of mental reaction upon a sensation already partially excited by the proper peripheral process of stimulation. This reaction, again, in all simple cases at least, must be viewed as

[1] These correspond to what we call 'external objects,' which thus constitute only one variety of 'objects of attention'.

arising at once out of the partial excitation of the psycho-physical process in sensation, which process thus constitutes the stimulus or excitant of attention. Thus, in the above example, it is the whole process of excitation due to the action of the image of the bird on the retina, which arouses the mental attitude of *looking at* and so specially attending to this object.

Positive and Negative Aspect of Attention. Again, our definition of attention implies that it is at once a reinforcing and a weakening of psychical contents. We cannot attend in one direction and so intensify a particular presentative element without, *ipso facto*, withdrawing attention from other directions, that is to say, inhibiting other simultaneous presentations. To look closely at a thing is for the moment to be partially deaf to sound. Attention thus is essentially a narrowing or *concentrating* of consciousness, that is, a converging of the light of consciousness on a definite tract, like the central part of the field of vision, and a correlative darkening of the rest of the scene. In many of the higher forms of attention, specially spoken of as *concentration of mind*, we carry out particular movements in order to aid this process of quenching irrelevant and rival sensations, as in closing the eyes when listening.

Attention is a thing of degrees. No doubt we popularly talk of attending only where we put forth a specially high degree of exertion, and do so moreover by what is called a volitional effort. But the activity of attention reaches far below this rare exceptional effort. There may be momentary risings of attention, fugitive glances of the mental eye, as at a teasing sensation of bodily discomfort, of which we are only half aware. Such swift and instantly-forgotten movements of attention play a large part in the developed mental life of the adult. Attention extends from the severest to the least recognisable degree of conscious mental exertion.

The position of this lower limit fixes the extent of non-attention or inattention, that is, the absence of mental activity. In waking life we probably never realise a state of total inattention. Yet we may be said to approximate to such a point in all states of mental languor, drowsiness, mental fatigue, and so forth.

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The characteristics of the state of inattention are relaxation of effort, or cessation of the strain of attention, and a substitution for a lively predominance of certain psychical elements, of a dull level, *viz.*, a crowd of equally-confused sensations. These features of inattention are brought out by the common expression "scattering" or "dispersion" of thoughts, and the corresponding French term *distraction* (*cf.* the German *Zerstreutheit*).

Nervous Process in Attention. We have thus far considered attention merely on its subjective side as a mode of consciousness: we have now to inquire into its nervous concomitants. The fact that attention is a mode of *active* consciousness suggests that these will be found in certain *motor* processes: and observation bears out this inference. Thus, to begin with the simplest mode of attention, *viz.*, with sensations, when we are looking at an object attentively, we are carrying out a number of motor adjustments—such as accommodation of the lens, alteration of convergence—which subserve perfect vision. Along with these eye-movements there are head-movements which serve the same purpose. Similarly in active touching, and even in listening, attention seems to stand in closest connexion with motor adjustments.

There is reason to suppose that these muscular actions not only directly subserve to that clearness and distinctness of impression which it is the business of attention to secure, but contribute, in part if not altogether, the characteristic complexion of the mental state itself, *viz.*, the sensation of tension, strain or exertion. Close inspection will show, indeed, that in attending to a colour or to a sound the distinctive character of the experience is given by the concomitant sensation of muscular tension.

In addition to this muscular element connected with the due control of the particular peripheral organ engaged, there are other concomitant muscular actions. Some of these, as characteristic movements of the mouth, appear so early and so commonly that they probably depend on common congenital arrangements; others are distinctly acquired. This applies to certain useful movements, more particularly shutting the eyes, as some persons

uniformly do when they want to get a very nice impression of touch, as in feeling a texture, or when, like Goethe, they desire to listen as well as possible to music. These concomitant movements manifestly add a further element of active consciousness to the state of attention.

Lastly, reference may be made to that part of the muscular concomitant of attention which shows itself in the *inhibition* of movement. It is evident that a general stillness or motionlessness of the body is useful to close sense-observation. The keeping of the eyes and head *steady* already illustrates this inhibition of movement. Other illustrations of it are the cessation of locomotion when we want to listen or otherwise attend to sensations. Even the slight disturbing movements due to breathing are inhibited when we attend with the higher degrees of intensity. A man looking intently will involuntarily hold his breath. This inhibition of movement is brought about by tension in opposing muscles, and so adds new elements of conscious strain to all the more energetic forms of attention.

What is true of sensational attention is probably true also of ideational, *i.e.*, attention to *ideas*. Thus when we try to visualise, that is, imagine a visible object, as a colour, we can detect a sensation of muscular strain which is referrible to the peripheral apparatus engaged in actual seeing, *viz.*, the muscles of the eye, neck, etc. In addition to these there are, as in the case of sensational attention, concomitant muscular actions, as those in certain regions of the skin of the head, compressive movements of the mouth, etc. In certain cases also we get individual associated movements, as the fixing of the eye on a favourite spot in the room when we want to think intently. Further, we have in ideational as in sensational attention an inhibition of diffuse disturbing movement. Thus, during a prolonged effort of thought, the head is apt to be fixed, the breath held, as is indicated in the French expression for a close thinker, *de longue haleine*.[1]

[1] It is probable that these motor concomitants of ideational attention, like those of sensational attention, serve to some extent at least to ensure distinctness in the psychical result. This point cannot, however, be discussed at this stage.

It is doubtful whether this motor factor, large as it is, is the whole of the physiological process in attention. The intensification and clearer definition of a sensation of sound or colour by attention probably involves other neural processes which go *to intensify action at the particular points of the cortex engaged.* Thus in attending to a colour we may suppose that the activity of the colour-centre is somehow augmented. The nature of this process of central nervous reinforcement is not as yet understood. There is, however, some reason to suppose that a principal factor in this local intensification of central activity is a heightening of the blood-supply in the particular cortical tract and correlative diminution of it in other regions.

Attention as Adjustment: Expectant Attention. It follows from the above conception of attention as a reinforcing reflex that it is essentially a process of adjustment. In many cases we can see that we fail to fix and intensify a sensation because this adjustment is not completed. Thus momentary impressions of sight or hearing, especially if following one another irregularly, do not become distinct because there is not time for the responsive reflex action. Sudden and powerful impressions, *e.g.*, loud explosive noises, are with difficulty attended to, and are apt to leave a confused after-impression. It has been ascertained by experiment that the process of adjustment is easier and more rapid in the case of sensations of a moderate intensity than in that of very intense or very faint sensations.

The fact that there is an adjustive process in attention, the duration of which varies according as the conditions are favourable or unfavourable, is illustrated in the common experience that the fixing of attention is rendered easy and rapid or the reverse *by the preceding state and particular direction of the attention.* In a condition of mental lethargy or inattentiveness, as also of mental preoccupation, *i.e.*, pre-engagement of attention in other directions, a greater force of stimulus is needed to secure attention in the required direction. A boy buried in a book, or busy carpentering, is apt to be slow at hearing a question. On the other hand, the process of adjustment may be greatly aided by a

preceding congruent or favourable mode of activity. Not only is a state of mental wakefulness favourable to attention generally, but the direction of attention to an object A will under certain circumstances facilitate the subsequent direction of it to a second object B. This happens when the objects are homogeneous, as two visual impressions, say features in a room or landscape, and when in consequence the muscular adjustments are similar. It happens, further, as we shall see later, when the first and second objects of attention are connected or associated one with another, as the sound of a name and the idea of its owner; for in this case, owing to repetition and the formation of central connexions, the transition of attention is rendered smooth.

The process of adjustment has, in the cases hitherto considered, been supposed to follow the effect of a sensational stimulus. But with the growth of the power of ideation we are able, by *anticipating* a particular impression, to carry out the process before the presentation of the impression, in which case attention may be said to be *pre-adjusted*. This is seen in all cases of expectation or expectant attention. The consequence of such pre-adjustment is, as has been proved by experiment, a considerable shortening of the process by which sensations become distinct and are recognised. Here we have to suppose not only a preparatory muscular adjustment but a central psycho-physical preparation corresponding to the development of the *idea* of that which is expected.

This expectation may be of different degrees of perfection. Thus we may know (exactly or approximately) the *time* at which the sensation will occur In listening to a new poem or a new musical composition we anticipate the succeeding sounds in their regular recurrence. In the experiments referred to it has been shown that previous knowledge of the exact moment of the appearance of a sensation shortens the process of recognition.

Expectation, in the full sense, involves some previous knowledge of the nature or *quality* of an impression, and not merely of the point of time of its occurrence. In some cases I may be able to distinctly forecast the character of the particular sensation that is coming. Thus on watching a singer about to commence

a song with which I am familiar, I have an anticipatory idea of the opening tones. Experiment has further proved that such definite anticipation, by including a preliminary sub-excitation of the particular (*e.g.*, auditory) nerve-centre engaged, will still further shorten the process of receiving a sensation. Lastly, it has been shown that when this anticipation of the precise quality of an impression is supplemented by the prevision of the exact moment of its appearance, the duration of the process of recognition is reduced to a minimum, so that the process of pre-adjustment of attention may be said to be perfect.

The experiments here referred to belong to the new and promising department of experimental psychology known as Psychometry. The method of experimentation consists in estimating by a delicate chronometric apparatus the interval between the reception of a sensory stimulus, say a sound, by the subject of the experiment, and the actual execution of a responsive movement, as of the hand or a particular finger. This interval is known as the "reaction-time". The experiments, among other results, show that the reaction-time may be made half as long again when a disturbing sound (an organ playing in the same room) is at work. On the other hand, if the process of adjustment is carried out wholly or in part beforehand, the reaction-time may be reduced to a third or less.

Fixation and Movement of Attention. The process of attention has the immediate effect of *fixing* an impression. Attention is detention in consciousness. The more serious efforts of attention always imply a prolonged fixation of a particular psychical content or group of contents. At the same time, it is evident that the duration of this process of attentive fixation has its limits. It has been found that, when we try to attend for a considerable time to one and the same impression, the exertion does not remain of one uniform strength, but periodically rises and falls. This is illustrated in the common experience that in listening to the ticking of a clock, or to the continuous sound of a waterfall, there is an alternate increase and decrease in the intensity of the sound. This fact of periodic rise and fall in the strength of attention has been called the oscillation of attention.

Another fact to be noted in this connexion is the tendency

to movement or change of direction observable in attention. What may be called the natural condition of attention is a flitting or rapid passing from one object to another. This is illustrated in the incessant turning of eyes and head by a lively monkey in obedience to every new visual or aural impression, and in the infant's similar transitions from object to object. Even what we call prolonged concentration of mind on a single topic is in reality a succession of changes in the direction of attention, *viz.*, to new aspects, new relations of the subject.

These movements are determined, to some extent, by the very mechanism of attention. Thus it is evident that since all attention involves muscular action of some kind, the fatigue that arises from an undue prolongation of this action is favourable to a change in the direction of attention. As every teacher knows, a child, after attending closely to visual objects, as in drawing or other fine work involving the eye, welcomes a change in the direction of attention, as in listening to an oral lesson. A prolonged effort of attention will often tire us for the particular form of mental activity, *e.g.*, looking or listening, without tiring us for other forms.

Again, the very fact that at any moment we are exposed to the action of a number of rival sense-stimuli favours the movement of attention. When occupied with one particular impression, or group of impressions, the intrusion of a new one acts as a diverting force. This is seen more particularly when the new impression is strong or rousing on account of its changefulness, as in the case of all moving objects, which are known by the schoolmaster to be specially distracting. Novel impressions excite by the very fact of their being new, and standing out, so to speak, in relief against the collective horde of our acquired impressions. And when the effect of surprise is added, as in the case of all unexpected objects, the diverting force is increased. Hence, perhaps, the special tendency to wandering of the attention on the part of children, who are much more under the stimulus of the new, the extraordinary, and the wonderful than older people.

The readiness with which these transitions of attention can

be made varies with a number of circumstances. As already suggested, the existence of any connexion between one impression or idea and another greatly favours the movement of attention from the first to the second. As we shall see by-and-by, there is a special tendency to a hurrying on from sensations or ideas relatively uninteresting to associated ideas which have a strong interest for us. This is illustrated in our scant attention to signs, such as spoken or written words, under the mastering influence of the ideas signified—a tendency which every proof-reader has to overcome.[1] Again, what is known as liveliness of temperament shows itself mainly, perhaps, in a special mobility of attention or readiness to transfer it to any new object. The bright, impressionable, versatile mind is characterised by rapidity of mental movement. Exercise and practice, moreover, do much to develop this power, just as they serve to strengthen the ability to prolong effort on occasion in some particular direction in patient concentration.

Analytical and Synthetical Attention: Area of Attention. All attention is a process of focusing, and as such a concentration or narrowing of the pyschical area. In the simplest mode of attention, as when a sound calls forth a reaction, we have the process taking on the aspect of a selective isolation of particular psychical elements. This isolating or analytic aspect of attention becomes particularly marked when we seek to break up the complexes of sensation with a view to single out particular constituents, as in analytically resolving the flavour of a dish into its constituents, and fixing attention on certain of these to the disregard of others.

While, however, attention is thus primarily separating or isolating, it has a second function, that of combining a plurality of

[1] Overlooking errors in spelling, etc., when reading a proof, arises from a double cause: (*a*) the want of interest in signs; (*b*) the usurpation of the place of perception by expectant imagination. One fails to detect the wrong letter or wrong word, because the *idea* of the whole word or whole sentence "blinds" us to what is actually presented. This second source of inattention will be spoken of when we take up the subject of perception.

sensations or other psychical elements. Thus we may attend not merely to a particular detail of colour in a picture, but to the *ensemble* of colours, not merely to a constituent tone in a musical accord, but to the accord as a whole. This synthetic direction of attention is, as we shall see when we come to deal with the process of intellectual synthesis, of the highest consequence.

Each of these modes of attention has its limiting conditions, which may be understood, in part, by help of the above conception of the psycho-physical process. Thus minute attention to details of a sensation-complex is favoured by their local separation, as in the case of a number of fine colour-details in a miniature painting. Such local separation evidently allows of a particular muscular adjustment to this, that and the other detail. In the case of sensations of sound, on the other hand, where such local distinctness and correlated muscular adjustment are wanting, minute analytical attention is rendered difficult.

With respect to the other mode, synthetic or combining attention, the general limiting condition is that the various 'objects' simultaneously grasped in attention stand in a certain relation one to another *as parts of one and the same whole.* The most obvious bond of connexion is that supplied by their being constituents of the same sense-domain. I can attend to two colours together, because they constitute features of one visible scene. Where disparate or heterogeneous sensations, as visual and auditory, are attended to together, as in watching the fingers and listening to the tones of a pianist, it is because they have come to be taken up into a new conjoint field through the working of the law of association to be spoken of presently. Here, again, it is easy to see that the particular combination of muscular adjustments required is facilitated by frequent repetitions in the past.

A special question arises in connexion with the synthetic direction of attention, *viz.*, the "area" or "span" of attention, *i.e.*, the greatest number of things which we can attend to at the same moment. A new light has been thrown on the problem by recent experiments. Thus it has been found that if a number of small objects, as printed letters or digits, are placed near one another so

as to be all visible in direct vision, and then looked at for a fraction of a second, just long enough to generate a clear retinal impression, from four to five can be instantaneously grasped together. When the objects can be grouped together as features of a familiar form, three times the number can be instantaneously attended to. The conditions of the experiments preclude the supposition that attention passes in this case successively from one to another of the objects.

Determinants of Attention: Interest. Attention, though a fundamental factor in our mental processes, is itself determined. The determining antecedents of attention vary with its form and its degree of development Only a rough account of these is possible at the present stage of our exposition.

In the earliest stage of attention, which is marked off as Reflex or Non-voluntary, the determining force resides in the sensation or its ideal representative. Here the direction of attention will be determined, on the one hand, by the strength and the persistence of the impression, and, on the other hand, by its suddenness, novelty, and generally its disturbing character in relation to the pre-existing state of mind. Each of these circumstances is important, and may suffice of itself to effect the reflex process. Thus a faint sound, as the striking of a distant clock, when repeated, gathers stimulatory force. A familiar object, as a picture on the wall, which, when in its customary place, would remain unnoticed, immediately attracts attention when moved into new surroundings.

It is evident that we have here to do with a germ of *feeling*. A sudden and novel impression commonly, if not in all cases, excites a certain amount of feeling, whether it be of agreeable exhilaration or of disagreeable shock ; and this element of feeling seems to intensify attention in these cases. This influence becomes more manifest where the sensations have a *considerable* element of the agreeable or disagreeable. A bright colour, a sweet sound, and, on the other hand, a hard, grating noise, attract the attention by reason of the feeling that they excite. How strong this force of feeling can be is plainly seen in the early

appetite-prompted actions of a child. A hungry infant enjoying its meal becomes amazingly inattentive to everything else.

A considerable extension of the range of attention is effected when the processes of association have been carried far enough for present impressions instantly to revive and connect themselves with previous ones, as when a child's attention is drawn to the process of preparing its food, or to some new object which immediately suggests a familiar one by its likeness. Here the presentative element is reinforced by the addition of representative elements, the *residua* of earlier impressions, and thus the process of attention involves more of the ideational or central factor spoken of above. The attractive force in this case too is determined by the volume and intensity of the feeling excited, only that the feeling is here no longer a direct result of the present sensation, but bound up with ideas of past impressions and so revived along with them.

The facts just touched on are commonly spoken of as the effect of Interest. When it is said that we attend to what interests us it is meant that we attend when our feelings are touched, that is, to objects or ideas which directly or indirectly excite feeling. We may thus be said to be interested when we experience a pleasurable sensation, *e.g.*, that of a sweet sound, and our attention directs itself to its cause. In the narrower sense we are 'interested' where a new presentation comes into relation to our previously acquired stock of ideas and their attendant feelings, that is to say, calls up and becomes complicated with an idea or cluster of ideas having some affective accompaniment. Thus a child begins to be interested in talk about itself as soon as the idea and connected feeling of self begins to grow a distinct, stable, and readily excitable factor in its consciousness. This tendency to give attention to what comes within the circle of established feelings and interests is made use of by the modern educator as the basis of teaching method.[1]

[1] Herbart and his school describe the fixing of a new sensation through the revival of kindred ideational elements as a process of Apperception. The new presentation is said to be apperceived by a pre-existing cluster of ideas.

We thus see that attention is under the sway of two opposed forces, novelty and familiarity. The new, the rare, the unexperienced exerts a powerful spell on the attention, not only of the child, but of the adult. On the other hand, in proportion as fixed interests, that is, ideational complexes bound together by a common feeling, form themselves, and, one may add, as novelty of impression diminishes, these interests tend to draw off attention from the wholly new in the direction of the familiar. Thus, as feelings settle down to steady tastes and inclinations, the child attends more and more to what connects itself with and helps to gratify these. Even here, however, the attractive force arises from the *partial* novelty of the impression. What is wholly familiar, as the objects of our daily environment, does not attract our attention. "Familiarity breeds contempt" in this sense also As pointed out above, it is the presentment of the old in a new setting that really excites the attention in such cases.

Transition to Voluntary Attention. As the last stage in the development of attention we have its voluntary direction and control. This is marked off by a clear idea of *end* or purpose. We attend voluntarily when we wish to obtain some object of desire, as a piece of coveted information. The nature of this volitional process can only be understood when we come to consider conation. Here it must suffice to point out that it emerges gradually out of the feeling-prompted attention just considered as soon as experience and mental development render possible an anticipation of the results of our activity. Thus a child begins to attend voluntarily when he maintains a pleasurable sensation, *e.g.*, that of a sweet tone, under the pressure of a vague impulse to *go on* enjoying. The transition is seen, too, in the growth of curiosity, or a desire to examine and understand a new object, which commonly takes its rise in some pleasurable impression due to the novelty, or the prettiness of the object.

This transition to voluntary attention does not mean a liberation of attention from all determining influences. Interest is still the stimulus which excites the reaction, only that the interest is here less direct and of a borrowed or reflected kind. Thus,

when we attend to an otherwise dry and repellent subject because we see that the knowledge of it bears on some object of desire, we are, by thus connecting it with the desired object, investing it with a *derived interest*. To this it may be added that in such cases the volitional effort at the outset is apt to be soon relieved by the inherent attractiveness of the subject that discloses itself to patient attention.

The effect of this development of interest and of will-power on the attention is greatly to widen its range, and also to facilitate a more exact and more prolonged adjustment. The widening of the range is illustrated in the effect of a growth of scientific or artistic interest by which small, obscure, and commonly-overlooked phenomena of the outer world become objects of close scrutiny. The increased prolongation is seen in the continued pursuit of artistic, scientific, and other lines of activity.

In addition to the special stimuli or excitants just considered, there are more general conditions of attention. These may be summed up under the comprehensive head, degree of vigour of the central organs. Attention being the greatest expenditure of psycho-physical energy, it is evident that its efficient carrying out presupposes a normal vigorous condition of the brain-centres.

Effects of Attention. Turning now to the effects of attention we find that (*a*) one of its most immediate results is an increase in the intensity of a sensation. Thus by attending to a sensation of sound we bring its intensity up to its full or perfect degree.

(*b*) Along with this increase in intensity, and of equal if not of greater importance, there goes increase in definition of character. It is when we attend to a sensation of colour, taste, and so forth, that this acquires distinctness of quality. Similarly the precise extensity and duration of a sensation grow distinct only when attention is added.

(*c*) Attention secures a certain persistence in the sensation or idea. Thus by looking at a colour I prolong for an appreciable period the sensation of this colour. In the case of ideas the fixing of attention tends, still more manifestly, to prolong their

presence in consciousness. This power of detention will be found to be of the greatest consequence for the elaboration of psychical material.

(*d*) Lastly, this attention and detention lead on to retention. It is, as we shall see presently, by fixing attention for an appreciable time on a presentative element, say the note of a thrush, that we are able to connect it with, or bring it into relation to, other elements, the sight of the bird, and so secure its subsequent reproduction.

We thus see that attention underlies and helps to determine the whole process of mental elaboration. It secures, in the full intensity, distinctness, and due persistence of the presentative elements, the fundamental condition of those processes of differentiation, assimilation, etc., in which the work of elaboration properly consists.

From this slight account of the place and function of attention we can see the importance of a proper development and training of it. A trained ability to fix the thoughts on a subject is the prime condition of all mental achievement, whether in the domain of intellectual activity, as in scientific research and literary production, or in that of practical affairs. Since, however, the strengthening and perfecting of the attention is essentially a process of volition, the practical question how this can be best carried out will be most profitably considered when we have dealt with the volitional process itself.

REFERENCES FOR READING.

On the nature of Attention the following may be consulted:—Hamilton, *Lectures on Metaphysics*, vol. i. lect. xiv.; Ward, article "Psychology," *Encyclop. Britannica*, pp. 41, 42; and James, *Psychology*, i. chap. xiii

CHAPTER VI.

PROCESS OF ELABORATION (*CONTINUED*): DIFFERENTIATION AND INTEGRATION.

Factors in Mental Elaboration. The process of attention considered in the previous chapter prepares the way for the proper work of elaboration of the psychical elements. By this is meant the carrying out of certain processes into which the sensational elements enter as materials or constituents. Thus we may say that the visual sensations of colour, etc., are elaborated when they are distinguished one from another and combined in certain groups, as the total visual presentation of a particular flower.

If now we ask what these processes are, we find that they are only another aspect of the elementary processes already spoken of as constituting what we call intellection, that is to say, Discrimination, or as it may be also called Differentiation (*i.e.*, Differencing), Assimilation, and Association, the two last forming together Integration (or "wholeing"). Our mental life unfolds by help of the renewal of these elementary functional activities. Thus, just as we know a thing by distinguishing it, so the contents of mind become more numerous by successive differencings of what was before confused. In like manner, assimilation at once enters into every process of knowing, as in recognising a taste, and aids in the longer process of mental development by producing new permanent modes of grouping of psychical elements, as in the classification of like objects by help of a general name. The same thing holds good of association. Not only is the interpretation of this, that, and the other sensation-complex, *e.g.*, the succession of creaky sounds of a person walking upstairs, an illustration of association or suggestion, the process of associative combination

is a main factor in development. This is seen in the progressive elaboration of what is relatively simple into more and more complex products, for example, the growth of our whole, highly-composite idea of a particular man, or locality, into which each new year's experience incorporates additional associated elements.

A word or two by way of illustration on each of these processes will prepare us to view the whole movement of mental development.

(A) **Process of Differentiation.** By the term differentiation the biologist means the gradual emergence or appearance of difference (heterogeneity) between one tissue or one organ and another, as the development of an organism proceeds. This process, we are told, begins with a relatively simple or homogeneous structure, which gradually takes on more and more of heterogeneity and speciality through segmentation or division of parts, the several parts taking on a dissimilar structure.

Applying this idea to mind, we can speak of differentiation as the emergence in consciousness of distinctness and speciality. Thus the infant's colour-sense, though, if a normal one, *potentially* including all nuances of colour-quality, realises as yet but few, if any, qualitative varieties. The progress of sense-development means primarily the substitution of a more and more varied range of sensations, of a larger and larger number of dissimilar impressions. And it will be found that the whole development of the intelligence consists in part in the advance of such differentiation.

It has already been pointed out that attention is in its general nature selectively isolating. When an infant first fixates an object, as a bright light, it virtually differentiates the impression from those of surrounding objects. In other words, by this process of adjustment a separate and distinct impression is secured. The peculiar character (quality, strength) of the impression begins to make itself known: definiteness of impression begins to be experienced. In a wide sense, then, all attention, as selective, isolative and defining, is a process of differentiation.

We may trace the process of differentiation or differential de-

finition in various directions. At the beginning of life we may suppose that sensational consciousness as a whole is a confused mass in which differences are only vaguely emergent. Among the first distinctions to appear would be the broad generic ones between sensations of different classes, as a taste, a smell. The process of differentiation or psychical segmentation would reach a more advanced stage when distinctions within the same class of sensations began to present themselves, as different tastes, different colours, etc.

Along with these distinctions of qualitative character, those of intensity and of volume or extensity, and of local character, would gradually come to be noted. Thus, for example, different degrees of pressure, different extents of colour, and touches of different local character (at this, that, and the other point) would be separately attended to.

This process of differentiation progresses gradually. Just as tastes are first differentiated from other classes of sensations before one taste is differentiated from another, so within the limits of the same special sense the process advances from broad to finer and finer distinctions. Thus we know from the way in which the colour-vocabulary grows in the case both of the individual and of the race that a red is distinguished as such before a particular shade of red, as scarlet or crimson, is distinctively noted.

The course taken by this progressive movement of differentiation is modified by the forces which act upon and determine the directions of the attention. Hence it is far from being perfectly regular, and probably varies considerably in the case of man and other animals, as well as in that of different men. Superior strength and vivacity of impression count for much here. This is illustrated in the fact that the brightest and most stimulating colours (reds and yellows) are in general the first to be singled out and recognised by the child. Much depends, too, on the value of the particular sensation as bearing on the special interests of the species or individual. Thus the dog first selects and particularises among smells that of his food, his master, etc.; the

horse singles out among colours that answering to wholesome herbage, and so forth.

Differentiation and Discrimination. We have thus far considered differentiation merely as a process of distinctively marking off or defining particular varieties of sensation. Here, through special adjustments of attention, particular sensations of colour, taste, and so forth, come to be distinguished as this, that, and the other. Such differentiation or particularisation of sensational character does not, however, amount to a full consciousness or mental grasp of *a relation of difference* between one sensation and another. Still less does it include a clear apprehension of the precise feature, *e.g.*, intensity, quality, in which two sensations differ, or the extent of this difference. Such a clear apprehension or grasp of difference, as distinguished from a singling out of, and attending to, distinct and different sensations, is best described as an act of conscious Discrimination. Differentiation, in the first sense, precedes discrimination. The latter only becomes possible as impressions are retained and processes of comparison between impressions are carried out.

True discrimination may be supposed to arise out of differentiation in this way: A child in passing from darkness to light, from cold to heat, would at first have only a vague consciousness of change or transition. But by acquiring the power of going back on the preceding sensation, and representing it along with the latter one, he would little by little gain an apprehension of a particular kind and amount of difference.

Law of Change or Relativity. It is commonly held that change or difference of state constitutes a fundamental factor in our conscious life. A dead level of sensation without the least introduction of freshness or variation would be indistinguishable from sleep. As Hobbes has it, "Semper idem sentire ac non sentire ad idem revertunt". This fact of the dependence of mental life on change has been formulated under the name of the Law of Relativity.

This law of change or variety finds its explanation in part in the very conditions of vigorous nervous action. Prolonged stimu-

lation of a nervous structure is attended in certain cases at least with fatigue or falling off in functional activity, a result which shows itself subjectively as diminished intensity of sensation. Change of stimulation, on the other hand, by calling into play a fresh organ, ensures greater intensity in the psychical effect Further, we have seen that the frequent diversion of the adjustive process from one impression or region of impressions to another is necessary to a vigorous maintenance of the attention. This is strikingly illustrated in what has been called "the acquired incapacity" to attend to constant and unvarying impressions. The miller after a time fails to hear the noise of his mill.[1]

According to one rendering of the Law of Relativity, change is not only a general condition of distinct and vivid sensation, but it is one factor in determining the particular *quality* of a sensation Thus it is said that black is only seen to be black *in contrast to white*, that the several partial colours are for us what they are because of their *relations* to other colours. It seems, however, more correct to say that the quality of a sensation is determined by the particular psycho-physical process involved in the sensation, though the juxtaposition of a dissimilar and *contrasting* sensation is one principal means of arousing the attention to its peculiar character.

(B) **Process of Assimilation: Relation of Likeness.** The second of the constituent processes entering into intellectual elaboration is known as Assimilation. This may be taken to include all processes by which like sensations or other psychical contents "attract" one another and tend to combine or coalesce, as in recognising a taste as like one previously experienced. As a mode of bringing together and combining presentative elements assimilation is clearly opposed to differentiation, which in itself tends to a marking off or isolation of psychical contents, and so it constitutes one part of what is known as integration.

When we say that assimilation is the conjoining of like sensations, we mean by likeness any degree of similarity from the lowest

[1] It is uncertain how far the apparent loss of intensity with prolongation of the stimulus is the result of fatigue in the sensory centres or of the relaxation of the attentional process.

degree of imperfect likeness which is just perceptible up to perfect likeness or psychical 'equality'.[1] Two sensations may be appreciably like one another yet far from quite or completely similar, as in the case of two adjacent members of the colour- or tone-scale or two adjacent sounds in the scale of intensity or loudness. The relation of likeness is here regarded as a perfectly simple and fundamental relation, co-ordinate with dissimilarity or difference. Perfect likeness, it may be added, whether of quality or of intensity, must be estimated for practical purposes by *indistinguishableness when attention is closely directed to the sensations.*

The distinction of perfect and imperfect likeness just spoken of has to do with differences in the degree of the likeness. In addition to these there are differences in the extent or area of the likeness. Thus two colours may resemble one another *totally* in all points, tint, saturation, etc., or only *partially* in some one or more of these constituent features. A good deal of what we ordinarily mean by likeness, more particularly when we ascribe likeness to those complexes which we call 'things,' is of this partial character.

The simplest expression of the assimilative function is to be found in that process by which a present sensation (or sensation-complex) is apprehended as something familiar. This is spoken of as Recognition or *knowing again.* It may be illustrated in the effect on the infant consciousness of recurring and interesting sensations, *e.g.*, the colour of milk, the sound of the mother's voice. Such assimilation is automatic or 'unconscious' in the sense that there is no separate and distinct recalling of a past sensation, and clear awareness of the relation of the present sensation to its predecessor, but merely a vague sense of familiarity, of likeness to something past, or of 'over again'. Here we suppose the new sensation to be modified by the traces of previous like sensations.

[1] The term 'identity' is sometimes used to indicate such perfect likeness But the word is open to the objection that two sensations experienced at different times are not the 'same' in the sense in which a *thing* seen to-day is the same as the thing previously seen. The nature of this identity will occupy us later.

This automatic assimilation by accumulation of traces plays an important part in early mental development. Recurring sensations, *i.e.*, the occurrence of like sensations or sensation-groups, is, indeed, a necessary condition of this development. A child soon begins to bring together and class its sensations; and, indeed, by common consent, it begins to do this hastily and even recklessly, classing things which are only partially alike (provided the like feature is striking and interesting), and overlooking differences, as in confusing different varieties of animal sound or form. Such automatic assimilation of new to old impressions is the first step in the formation of the connected whole which constitutes knowledge.[1]

A higher state is reached when differences are sufficiently marked to require a special isolating act of attention to the similar ingredient of the complex, as when a child recognises the mother's voice *when she is playfully disguising it.* This fixing of the attention on a similar feature or features in the midst of diverse elements involves a germ of the higher abstracting attention which will be found to play so prominent a part in the later intellectual processes.

This last process forms a transition from automatic assimilation to conscious comparative assimilation, *where the relation of similarity begins to be specially attended to.* Mere recognition with its complete coalescence of the *residua* of past sensations with the present does not imply such apprehension of relation. In the case of likeness, as in that of difference, this apprehension emerges gradually. Thus the child would begin to become conscious of likeness when the process of automatic assimilation was checked, *e.g.*, when puzzled by seeing its mother in a new dress.

Relation of Differentiation to Assimilation. The two processes of differentiation and assimilation, though, as we have seen, in a manner opposed one to another, are carried out together, and in close connexion. And it may be as well to point out the nature of this connexion at once.

[1] The reader should notice how knowing or cognising and recognising begin and progress together, being only different aspects of the same process.

First of all, then, since assimilation implies attention to a new sensation, it may be said in every case to involve a measure of differentiation. A child cannot assimilate a taste, a touch, and so forth, till it mentally fixates, and so differentiates, this sensation. Our power of picking out and recognising particular elements in a sensation-complex, *e.g.*, tones in a clang, obviously implies the power of differencing these from the other concomitant elements. Further, the exactness of the assimilative process throughout waits on the advance of differentiation. Thus the child begins, as we have seen, by roughly classing different varieties of red as red long before it more exactly classes a particular variety, *e.g.*, scarlet or plum-colour, as such.

This consideration helps us to understand what is meant by saying that assimilation (likeness) precedes discrimination (difference) in the development of the child. Crude assimilation undoubtedly progresses in advance of discrimination. Witness the daring of childish classification, as when it calls all males "dada," a rabbit "ba lamb," and so forth—a matter to be dealt with more fully by-and-by. On the other hand, assimilation *as a precise process* involves discrimination.

While, however, differentiation thus circumscribes the area of exact assimilation, assimilation reacts upon differentiation. It is, as already pointed out, through the interest awakened by an element of the old or familiar in new impressions that attention comes to be directed to these, and so the differentiating process to be carried a step further. If I did not recognise something familiar in this colour-group, this voice, and so forth, that is, *partially assimilate it*, I should not scrutinise it so carefully, and so grow aware of its finer points of difference.

(c) **Process of Association.** The third process involved in mental elaboration is known as Association. By this is meant that mode of psychical combination or integration which binds together presentative elements occurring simultaneously or in immediate succession. Thus, for example, the several sensations that a child receives together from one and the same object, as those of warmth, softness, and smoothness from the mother's breast, become

conjoined, tied together, or integrated into one complex. It may be added that such integration has for its main condition, in addition to the occurrence of two sensational elements simultaneously or in close succession, a mental reaction on these, either in the shape of a simultaneous grasp of them by attention, or of a rapid movement or series of movements of attention from the one to the other.

When we say that a mass of sensation-elements has been integrated we imply that when next we experience a part of the aggregate this will tend to *recall*, that is, revive under a representative form, the rest of the aggregate. Thus we know that the sight and taste of the infant's food have become integrated when the former manifestly calls up a representation (expectation) of the latter.

It follows that psychical association always has reference to a retention of impressions and a subsequent process of reproduction. We must, therefore, give a brief preliminary account of these processes, though a full exposition of their laws will be postponed until we take up the phenomena of mental representation.

Retentiveness and Reproduction. By retention as a psychological phenomenon is meant in general the fact that a sensation tends to persist, or to be followed by some analogous after-effect when the process of stimulation has ceased. In its simplest form it shows itself in the *temporary* survival of a sensation after the stimulus ceases to act, as when we retain an after-image of a bright object, say the sun's disc, some seconds after looking away from this. Here we suppose that the process of central excitation, after having been started by the peripheral stimulation, is capable of being prolonged, just as a tight string will go on vibrating after the withdrawal of the force which originated the movement.

In its higher manifestation retentiveness refers to the revival or reproduction of a sensation after a considerable interval, as when a hungry child recalls the sensations of feeding. Here, it is evident, retentiveness means something different from what it meant in the case of the temporarily prolonged or surviving

sensation. The sensation recalled is not supposed to have persisted, at least as a conscious sensation, during the interval. How then are we to conceive of the retention of it during this period? Two answers at once present themselves. (1) It has persisted as a true psychical phenomenon, but, having fallen below the threshold of consciousness, it has failed to make its existence known. (2) It has not existed at all as a psychical phenomenon, but the 'retention' is referrible exclusively to the persistence of certain changes, changes variously spoken of as physiological 'traces' or 'dispositions' in the nervous centres.

The process of reproduction is something added to mere retention, since it implies the re-excitation and reappearance of the impression, no longer indeed as a sensation, but in a new representative guise. This reproduction appears in a crude or nascent form in automatic assimilation. When a new sensation or sensation-complex is recognised as something familiar it is because of the revival and coalescence with the presentation of representative *residua* of past sensations. Here, however, as pointed out above, the revival is in most cases nascent and incomplete. This partial reproduction, being due directly to the stimulus of a similar sensation, has been called Immediate Reproduction.

The other and more perfect form of revival of a presentation, distinguished by some as Mediate Reproduction, involves the absence of a like presentation at the moment. We cannot recall a colour and see a perfectly similar colour at the same instant, just because a presentation and its corresponding representation, being qualitatively indistinguishable, irresistibly coalesce. Perfect revival can only take place in a free form, through the rousing action of some other and unlike stimulus. Such a stimulus is supplied by some connected or associated presentation, as when the *name* yellow calls up the image of the colour. Hence this fuller form of revival may be described as Associative Revival or Suggestion.

Such associative revival begins as soon as sensations by repetition and cumulation of *residua* have acquired the requisite

degree of after-persistence, and association has knit together with sufficient firmness different parts of a sensation-complex. Thus the infant's first observable revivals, *e.g.*, the suggestion of eating, of bathing, by the sight of the food, of the bath, illustrate at once the persistence and the weaving together of sensational elements.

This associative revival, like the processes of differentiation and assimilation, appears under an earlier implicit or sub-conscious, and a later and more explicit and clearly-conscious form. In the connexions which enter into our every-day perceptions we have a number of disparate presentative elements (tactile, visual, etc.) solidified in an inseparable mass. In looking at water, at a smooth marble-slab, touch-elements, coolness, smoothness, mingle and tend to blend with sight-elements. Here the representative is submerged under the presentative.

If now we turn from the lower sphere of sensation and perception to that of ideation, *i.e.*, imagination and thought, we shall find association taking on a more explicit and easily-recognisable form. In recalling a series of events we have what is called a train of ideas or mental representations in which the several members are distinguishable as discrete psychical states. It is in this higher domain, accordingly, that we shall expect to see the workings of associative integration illustrated most plainly.

Without anticipating our more complete account of the law of associative revival or suggestion, we may just note its two main conditions.

(1) In the first place, then, retention is determined by the *intensity* and *distinctness* of the presentative element. Now we have seen that attention tends directly to the increase of each aspect. Retention may thus be said to depend on the *closeness of the act of attention and the consequent degree of differentiation*. Hence one reason why the organic sensations and those of the lower special senses are not readily revivable. We cannot isolate and differentiate elements of taste as we can analyse a sound, or distinguish simultaneously a number of tactile or visual sensations. It follows that feeling, which, in the form of interest, is the great

sustainer of the process of attention, is the main promoter of retention.

(2) The other main condition of associative reproduction is the repeated and uniform recurrence of the associated elements as parts of one co-presentation. This second condition, usually dealt with under the head of *repetition*, will be found to be all-important in the work of associative integration. The child connects the look with the taste of the orange, the form of an object with its name, as the result of repeated presentations of the two together.

Physiological Basis of Reproduction. It remains to say a word on the probable physiological conditions of this revival. According to the common view this revival involves and depends upon the re-excitation of the central structures originally excited by a peripheral stimulation. In other words, the cortical seat of the sensation and of the idea are the same. Such re-excitation is further supposed to be similar in its character to the original excitation, though of a less wide extent than this, since it does not involve the peripheral region of the nervous system.

In the case of that partial or nascent revival which takes place in assimilation we have to conceive of the nervous process somewhat after this manner. When a particular central element or cluster of elements is re-excited to a functional activity similar to that of a previous excitation, this new activity is somehow modified by the *residuum* of its previous activity or surviving 'physiological disposition'. This modification is the only assignable nervous substrate of the consciousness of familiarity or recognition.

In complete or Associative Revival the physiological process will be somewhat different. Here we suppose that the excitation of a central element (or group of elements), P, answering to the reviving stimulus, occasions by way of *special lines of nervous connexion* a re-excitation of a second element, Q, more or less remote from P, which answers to the revived psychical content. Thus, following the common view, we conceive that, when the sight of the milk calls up in the child's mind the idea or representation of the taste and of the appropriate movements, the excitation of

the child's visual centre transmits itself along certain nervous paths to the centres of taste and movement, producing a re-excitation of these centres. According to this view the building up of psychical connexions has for its physiological groundwork the formation *of definite lines of nervous discharge.*

Unity of Elaborative Process. The process of psychical development is one organic process. We have already seen that the two processes, differentiation and assimilation, are inseparably connected. It remains to show the same thing with respect to each of these and the third process.

(1) Beginning with differentiation, we can easily see that it goes on hand in hand with integration. Looked at in one way, differentiation is the initial process in association. In order to mentally connect two sensations, say the tone C with the adjacent tone of the scale D, we must first discriminate them. Hence discrimination has been viewed by Bain and others as the most *fundamental* of the intellectual processes.

At the same time it would be an error to suppose that we clearly apprehend differences among our sensations before we begin to integrate them. As already remarked, sensations are given as complexes, and begin to be attended to as such, and so integrated before any careful analytic separation or discrimination of constituent parts is carried out. Thus the complex, warm—smooth—soft, corresponding to the mother's breast, begins to be known and marked off from other complexes before the comparatively abstract or analytical apprehension of warm as a separate sensation (or quality of object) is reached. This is sufficiently attested by the fact that even after the child has come to the use of words it is some time before it begins to qualify things, that is, mark off single qualities by the use of adjectives.

Not only does associative integration thus run on concurrently with, and even in advance of, differentiation, it is one means by which the latter is rendered more exact. That is to say, any two things which are only imperfectly distinguished will become better distinguished by taking on unlike associative adjuncts, and the greater and more impressive the associated differences, the greater

the amount of their improving effect on the discrimination. Thus if we let a and α stand for two imperfectly-differentiated sensations, KM and XY for their associative adjuncts, it is easy to see that aKM and αXY will be more readily distinguished than a and α apart. Instances of this will occur as we advance.

(2) If now we inquire into the relation of assimilation to association, we find that the two proceed concurrently as organically-connected processes or parts of one process.

It follows, to begin with, from what has just been said that automatic assimilation (immediate reproduction) starts with a complex coherent mass rather than with its constituent parts. Thus the child assimilates the sensation warm as an ingredient of a complex, *e.g.*, warm body, warm milk, before it assimilates it separately.

If now we look at the higher process of association (mediate reproduction), which involves distinct representation or reproduction of sensations, we find that automatic assimilation forms the initial phase of the whole operation. Thus, before the child can, upon seeing the milk, recall the taste, etc., it must assimilate or recognise the presentative element, *viz.*, the visual sensations, white colour, etc. Assimilation is here the initial step of the whole process [1]

It may be added that retentiveness, which we have found to be the fundamental condition of associative reproduction, must be assumed to be co-operating throughout the process of elaboration. Not only is it, as we have just seen, involved in automatic assimilation, it is involved also in a rudimentary form in the

[1] This may be symbolised thus—

$$V \rightarrow \left\{ \begin{array}{c} s \\ | \\ (v) \\ | \\ t \end{array} \right.$$

where the large letter V stands for the presentative part (visual impression), the small letter v in brackets for the *residuum* of past similar impressions which is excited by and at once coalesces with V, giving this its aspect of familiarity or representativeness, and the other letters for the distinct representative elements, taste, etc.

simplest type of differentiation; for the conscious transition from one sensation to another and unlike one, as from cold to warm, obviously depends on *the temporary survival of the antecedent sensation.*

The importance of retentiveness as a condition of this composite psychical process may be seen in another way. Each of the processes advances gradually, the new and higher stage presupposing and depending upon the lower stages. Thus every successive act of differentiation renders possible a higher degree of the process through the subsequent persistence of its products. For example, by distinguishing the colour blue from other colours and retaining this presentation as a distinct element, a child is prepared to take a new start, *viz.*, in the direction of marking off from one another this, that and the other variety of blue; or, taking instead of single sensations the complexes which our experience gives us, we may say that the persistence of the first vaguely differentiated presentation of a flower as a whole, prepares the way for a more complete differentiation of it with this and that detail distinctly apprehended. It is this circumstance that is pointed to in the well-known maxims: 'Exercise strengthens faculty,' 'Practice makes perfect'.

COURSE OF DEVELOPMENT.

Stages of Intellectual Development. Our analysis of the process of mental elaboration has now been carried sufficiently far to enable us to trace out in its main features the general course of intellectual development.

This intellectual development may be described, agreeably to the general idea of development, as a progressive double movement of separation and combination, with the result of an emergence of more and more complex or highly elaborated products. This result is secured by the three constituent processes just described.

Beginning then with an initial state of vague undifferentiated sensation or sentience, we find that the progressive movement of

the elaborative process gives rise to three successive products, which constitute advancing phases or stages of elaboration. These are Percepts or sense-intuitions, Images or representations of concrete objects, and Thoughts or representations of general classes or abstract qualities.

(1) The first stage in true cognition is reached when a mass of sensations has been differentiated, assimilated and integrated into a percept. By a percept is here understood the outcome of an act of sense-perception. Thus, when the child has reached the stage at which it has welded certain sensations of taste, touch, and sight into a thing which it calls 'the milk,' it has a percept. Perception is the beginning of true cognition. It is the first and lowest stage in the organisation or unification of experience. As the content of a percept is to some considerable extent presentative, perception is commonly spoken of as Presentative Cognition.

(2) By an image is meant the ideal copy or representation of the percept. We imagine an object, *e.g.*, a picture or tune, when it is no longer present to sense. Images are thus marked off from percepts as wholly or purely representative, and hence the operation by which we form images is spoken of as Representation or Representative Imagination. Such imagination is only possible after percepts have become sufficiently fixed or set. Its appearance is the full indication of the mind's retentive and reproductive power. So far as the images are representative of past percepts, imagination does not add to, but simply preserves, cognition under a new or representative form. The child, by being able to imagine the dog barking, knows the fact not only when it happens to hear the sound, but afterwards.

What is commonly called *imagination*, however, includes more than a mere revival of past percepts. In addition to this purely-reproductive imagination there is a productive imagination which involves a certain process of elaboration, as when we picture what is beyond the ken of the senses, *e.g.*, Niagara, the signing of *Magna Charta*, by help of impressions gained through these. This productive imagination will be found to play an important part in the early extension of knowledge.

(3) As the last stage we have thought-products, general notions or concepts, and judgments. This is the highest stage of elaboration, since it involves the perfect organisation and unification of experience in a general or universal form, and so in the form of a systematic and reasoned knowledge. This stage is only reached after a certain accumulation of images and a careful comparison of these. It thus presupposes not merely a considerable amount of previous differentiation, etc., but also the growth of the power of attention. A child cannot classify a number of unlike objects on the ground of a clearly-apprehended common attribute as round objects, transparent substances, and so forth, because it cannot hold different percepts and images steadily before its mind so as to compare them.

The direction of this whole process of thought-development may be described as follows. It is a transition from presentation to representation, from immediate cognition through the senses to mediate cognition by way of ideas. Such a movement is plainly away from sense. It substitutes for an outer sense-conditioned type of psychical activity an inner sense-detached type of activity. This detachment from sense appears already in imagination, which, though picturing the concrete and sensible world, does so apart from actual perception, and, as we may see in dreaming and childish reverie (day dreaming), may give rise to another and disconnected ideal life. It shows itself, however, still more plainly in thought proper, seeing that here the mind no longer pictures concrete objects *as they are known to sense*, but represents them in an abstract way, that is, under certain selected aspects, *e.g.*, form, and by help of word-symbols.

Popularly we speak of the several stages of intellective elaboration, perception, imagination, and so forth, as distinct *faculties*; but, as was pointed out above, there is no such absolute separation of different orders of psychical process as the idea of distinct faculties implies. The *stadia* (in the intellectual movement) here marked off one from another do not constitute sharply-divided stages in the actual process of mental growth. Thus, the percept will be found to form itself little by little out of

sensations, as these come to be gradually separated out and integrated into definite groups. Similarly the image first appears in a nascent, incomplete form as incorporated into the percept, as when in looking at a toy a child recognises it as the toy which he has lost and sought for; and it only detaches itself from its perceptual stem and attains to distinctness and independence by degrees. In like manner the general notion evolves gradually out of the image, as may be seen in tracing the steps by which a child passes from its image of some particular bird, say the thrush or canary in his cage, to the general idea of the bird.

Again, the actual course of intellectual development is not a simple succession of unlike phases, but a much more complex process. It involves *a concurrent advance of the earlier phases after the later ones have been added.* Thus a child goes on forming new percepts, and percepts of a more complex order, after it has begun to imagine and to think. This aspect of development may be expressed in every-day language by saying that *there is a development of single faculties concurrently with the development of the sum of faculties.*

Again, *the development of the higher phases of intellection reacts on the lower phases.* Thus, as we shall see, percepts come to be overlaid not only with images answering to previous single percepts, but with those general notions which are a kind of mental epitome of a whole class of objects. In looking at a common object, such as a house, the leaf of a tree, a book, we immediately view it as a member or representative of a general class. In like manner, when observing a natural phenomenon, the scientific observer recognises in it an illustration or fulfilment of a universal process or law.

Development and Habit. Mental development implies not merely an advance from lower to higher psychical forms, but a growing rapidity and facility in all recurring or repeated processes. This result, already touched on in connexion with organic development, is an extension of the psycho-physical attribute, retentiveness. We carry out accustomed acts of perception, as in recognising a person, customary trains of ideas, as in learning a

series of historical events, and habitual actions, as in swimming or skating, more and more rapidly, and with less and less strain of attention, just because of the organisation of the traces of previous like actions. So far as this organisation comes in, the conscious element grows weaker, and tends to lapse. To this extent habit would seem to imply no *psychical*, but only *nervous* development.

This dropping out of the conscious factor as the consequence of repeated exercise and of habit is, however, only one part of the result. The tendency of repeated psycho-physical processes to become automatic and unconscious sets free the activity of attention for further processes of psychical acquisition and growth. Indeed, it is only by this economising of attention or consciousness in the case of habitual processes that the more complicated psychical processes become possible. Thus it is by learning to recognise first words, and then groups of words, swiftly and automatically, that we are able to carry out the difficult, complex intellectual processes of reading.

Habit, as we shall see, has a narrower and a wider meaning. When it refers to the rigid fixing of ideas or actions in one definite order it is a force that opposes development. Habitual action or grouping of ideas means action or grouping which is with difficulty altered. This is seen in the case of the uneducated mind, which is narrow and rigid, just because it has formed certain fixed modes of associating ideas through which it cannot now break. But taken in a larger sense, as including all the effect of repetition of psychical processes, habit is an integral factor in the processes of development itself; for it is only by retaining the traces of our past activity that we can render this activity more perfect.

Development of Feeling and Willing. The development of the other two phases of mind, feeling and conation, follows the same general course, and exhibits the same underlying process. This results in a measure from the fact that the higher developments of feeling and conation are bound up with and depend upon intellectual development. This will appear more plainly when we come to consider the precise character of these developmental processes. Here we may content ourselves

by barely indicating the general agreement of the three directions of mental development.

The growth of feeling, like that of cognition, begins with an external sense-element, *viz.*, what we call a sense-feeling, and proceeds in the direction of internal states, *viz.*, emotions, such as sympathy, or the agreeable sense of self-approval, which involve representation or ideation. This process of affective development, moreover, is, as we shall see, brought about by a double process analogous to that of intellectual differentiation and integration.

In like manner, action begins with external bodily movement of an impulsive sense-prompted character, *e.g.*, the movements growing out of sensations of appetite, and passes on to a higher type of reflective or deliberative action marked by internal processes of reflexion and rational choice, as the deliberate selection of a house, of a career. And here, again, we see the double process of differentiation and integration at work. The development of volition is throughout conditioned by the separating off or discriminating of particular movements and combinations of movements, *e.g.*, those entering into speech, the finer sorts of manipulation. On the other hand, it proceeds by a progressive integration of motor elements, as in simultaneously combining a number of finger movements in striking a musical chord on a piano, or following out a succession of movements, as those of a dance.

Mental Development as Biological Process. As was shown in our sketch of the activities of the nervous system, psychical growth is correlative with and dependent on the formation of the more complex cerebral structures. Thus it is now known that all the higher intellectual processes (general thought) have as their physical substratum the growth of those particular centres and connexions between these which constitute the special central organ of language.

By thus connecting psychical with nervous development we are able to view it as one particular phase of organic development. This last process may be viewed as a progressive adjustment of organism to environment due to the repeated exercise of that sum of functional activities which we call life. Such progressive ad-

justment has, it is obvious, a teleological significance. It is only as this adjustment is effected that the conditions of stable life, that is, of permanent self-preservation, are realised The general course of psychical development is susceptible of being brought under this conception. The superinducement of the internal ideational upon the earlier sensational consciousness may be seen to involve a greater capacity of self-adjustive action. Thus, by imaging the remote results of our actions, *e.g.*, on our health or reputation, and by co-ordinating our particular experiences in the form of general rules, as the laws of health, we are able to carry out far-reaching and comparatively permanent forms of adjustment. The growth of intelligence is thus a progress towards a complete coping with our environment *in its whole extent and complexity*.

While we may thus see a teleological significance in the gradual evolution of conscious life, we find the same aspect of purposiveness still more plainly illustrated in that lapse of consciousness which, as we saw above, attends all properly organised action (see p 28). The phenomena of habit in the narrow sense, *viz*, sub-conscious and approximately automatic processes, involve an economising of the neuro-psychical forces. A familiar action, as walking or eating, done automatically without any effort of attention to the succeeding stages, is done at less cost than when such attention is necessary. Moreover, as automatic, that is, carried out without any preliminary reflexion, it is a swift and certain mode of response to the action of the environment.

It follows that it will be advantageous to the organism that actions should be carried out in this way *provided the circumstances are such as to require one unvarying mode of response*. And this condition is justified by the laws of the foundation of habit. For, as we shall see more fully by-and-by, a habit tends to form itself as the result of repetitions of actions in one and the same form, *e.g.*, dressing and undressing. We may thus say that in respect both of the domain of habit and of fully conscious reflective action, as also of the distribution of action between these two domains, our mental life illustrates the principle of utility or purposiveness. We are best fitted to cope with our life-

surroundings when we are able on the one hand to carry out all recurring uniform modes of responsive action easily, simply, and automatically, and at the same time to bring to bear a highly evolved reflective consciousness on new, difficult, and complex problems of life.

Social Environment and Development. While we can thus bring the process of psychical development into connexion with the collective functions of the organism, and so with the action of the physical environment on this, we must not omit to point out how in its higher and more complete form it involves and is conditioned by the action of that other environment which is marked off as the Social or Human. The influence of this environment is partly undesigned, as when a child is stimulated to imitate the words, actions, etc., of others, and partly designed or educative in the proper sense. The effect of it is seen throughout the whole process of individual development, and more and more clearly as we approach the higher stages of it. Thus, even a child's perceptions are widened and improved in quality by the educative influence of others, as in pointing to objects and naming them. In like manner, the reproduction of past presentations is greatly aided by the circumstance that the individual's observations have much in common with those of others, and that as a result of this he can recall his experiences in association with others through the medium of language. The influence of the social environment is still more apparent in the work of thought, which, as we shall see, is carried out by means of that great instrument of social life, language. All this higher plane of mental life is, indeed, only attained under the educating influence of a civilised community.

In like manner, the higher feelings, *e.g.*, sympathy, and reverence for the moral law, depend on social relations, and in this way the development of feeling presupposes the action on the individual of the social environment. Finally, the development of conation into its higher form of calm, rational action is brought about by help of the system of influences through which the community works educatively on its members.

Factors in Development. It may be convenient to sum up the result of our examination of the processes of mental development by enumerating its principal factors. If we regard the development of an individual mind as a phase of organic development, and so related to the action of the environment, we may conveniently distinguish two main co-operant factors, an Internal and an External.

(*a*) By the internal factor is meant the sum of primitive psychical capabilities, together with the correlated nervous arrangements which constitute the basis or starting-point of a normal mental life. Thus it will include the psycho-physical endowments known as the senses, also the fundamental intellectual, and other functions Further, if we suppose that acquired psychical aptitudes may be transmitted by inheritance, we shall include in the internal factor those instinctive tendencies or dispositions to think, feel, and act, in particular ways, which the child of a civilised race inherits as the result of repeated actions of his progenitors.

(*b*) By the External Factor we mean in the first place the physical environment or natural surroundings. The growth of intelligence, as also of feeling and of will, is conditioned by the action of the several physical agents, light, sound, etc., which stimulate our sense-organs, as also by the form and arrangement of things making up our natural *habitat*. Lastly, in addition to this Natural or Physical Environment, we have the Social Environment.

REFERENCES FOR READING.

A systematic treatment of the processes of mental in connexion with organic development is given by H. Spencer, *Principles of Psychology*, especially vol. i. parts iii. and iv. The constituent processes in mental elaboration are dealt with by Ward, article "Psychology" (*Encyclop. Britann.*).

PART III.

INTELLECTION.

CHAPTER VII.

PERCEPTION.

Sensation and Perception. Sensations, as we have seen, are not in themselves knowledge, but only the material for it. In order that knowledge may arise out of or by means of sensation, those processes of elaboration are necessary which were described in the last chapter.

The first stage of this complex process of elaboration is seen in those seemingly simple mental acts by which we refer a sensation (or a sensation-complex) to what is commonly spoken of as the external world, in other words, localise it in some region of space. In its complete form this external reference implies that we regard the sensation as the mark of a quality, *e.g.*, colour, weight, which quality we assign to a particular object situated somewhere in space; this object being viewed as external to, or distinct from, the mind which perceives it.[1] Thus we refer a sensation of sound

[1] The reader should note the ambiguity of the word external. An object is external which lies outside our body in space. In the philosophical sense, however, any part of our body as a physical object is external to the mind, *i.e.*, a part of the external (physical) world which is opposed to, and independent of, the internal world of mind. Since, however, mind is not in space at all, this last application of 'external' and 'internal' is clearly misleading (*cf.* pp. 2, 3).

of a certain kind to a particular direction in space, say to the right of us, and to a particular object, say to a bell, and in doing so we attribute the sonorous quality (state of vibration) to this object. The first process may be called the localisation, the second the objectification of sensation. As we shall see presently, these two processes are closely connected.

The two processes here spoken of, the localising and the objectifying of sensation, make up together what we commonly understand by Perception. Whenever we perceive a thing through or by means of the senses, we are thus assigning a sensation to a particular locality and a particular object. To perceive an orange, for example, is to refer a group of sensations of light and shade and colour to an object called an orange situated at a particular point in space. The result of this process, that is to say, the completed psychical product, is called a Percept.

It will at once be seen from this that perception is more of a mental process or an act of mind than sensation. In sensation (so far as we can imagine this apart from perception) we are comparatively passive and recipient; in perception we not only attend to the sensation (or sensations) discriminating and assimilating it, but pass from the impression to the object which it indicates or makes known.

The meaning of the word perception, like that of the closely-related term sensation, has varied with different writers. In common life we use the expression for almost any kind of cognition, as when one says. "I perceive a similarity between two ideas," or "a connexion between premises and conclusion". And earlier thinkers employed the term in much the same way. Recent psychologists, however, agree in the main in restricting the word to that mental process by which we discern an external object by way of the senses. This cognition of outer things is sometimes called external or sense-perception, to distinguish it from the mind's cognition of its own states, which is named internal perception.

Intra-organic and Extra-organic Localisation of Sensations. While a process of localisation takes place in the case of all sensations, it has not always the same form.

Thus, the lowest class, the organic sensations, are referred to a part of the organism itself, as when we localise a sensation of burning or tickling in a certain part of the skin. This may be called intra-organic localisation of a sensation. In the case of the special senses there is a further extra-organic localisation, in close connexion with what we have called objectification, that is, reference to a thing or object. Thus we refer a sensation of colour to the surface of an object lying in a particular locality. In this case we do not separately attend to the sensation as such and apprehend its organic seat but our mind passes at once from the sensation to what it signifies, *viz.*, the presence of an object in a particular region of (extra-organic) space, which object the sensation serves to qualify. What is commonly called perception is this reference of impressions of sight, touch, etc., under the form of qualities, as luminosity, hardness, to things external to the organism.

Process of Perception. It may be confidently asserted that in adult life we never experience a sensation which, provided it is sufficiently attended to and differentiated, we do not *at once* refer to an object in space. The reference may be more or less definite and complete. Thus a sound may be referred to a particular object, as a belfry, or only to some unknown object vaguely localised in space. But in a perfect or imperfect form such a reference always takes place And it takes place so automatically and instantaneously that it is difficult for the student at first to distinguish the act of perception from the mere sensation. The reason of this habitual interweaving of a perceptual process with sensation will appear presently.

There is every reason to suppose that this act of referring impressions to things or objects in space, though appearing to us so simple, immediate, and irresistible, is the result of a long process of acquisition or learning from experience. An infant in the first weeks of life betrays no sign of recognising the bodily seat of his sensations of heat and cold, or the direction of sounds. Perception is probably aided from the first by definite inherited tendencies; but it is only fully developed through the processes of individual experience.

Let us now analyse the process a little further. When on hearing a particular sound we say: 'A bell is sounding in such a direction,' the beginning of the psychical process is manifestly the differentiation and assimilation of an auditory sensation. If we had never had an impression before similar to this in some respect we could not now refer it to a particular portion of space or to a definite kind of object.

The second stage, that of perception proper, involves a process of integrative association. When we say (on the ground of an auditory sensation alone): 'I hear a sound over there,' it is because in our past experience this sensation of hearing has become co-ordinated or associated with other sensations, muscular and tactual, by which we gain the idea of direction or position. And, further, in referring this sound to a *bell*, I am recalling a complex of sensations of active touch and sight corresponding to the bell. If I had never heard sounds in the same quarter before, and if I had never handled or seen a bell before, the present sensation would not be referred to this locality and this object. The percept is thus the result of a process of associative fusion, or organisation of a number of elements into one mass.

As we have seen, all associative grouping of sense elements involves a germ of representation or ideation. In the case of the perceptual process it is manifest that the tactual and visual sensations answering to the touch and look of the bell are not actually present when we hear it and recognise it by the sound. They are revived or reproduced. In referring the impression of sound to the bell we are more or less distinctly representing or imagining the look and the touch of the bell. A part at least of our meaning in saying that we hear a bell in such a direction or at such a distance is that we know we might move in a particular way, say to the right, and come in view of, and into contact with, the bell, thus renewing these visual and tactual experiences. Hence perception has been described as "a presentative-representative process".

While, however, perception is, when viewed historically, a process made up of a sensational and an ideational factor, it is, as

already suggested, of the essence of the percept as a phenomenon of our developed consciousness, that it appears as a perfectly-welded sensuous whole. In cases of ordinary perception we do not consciously go through first a sensational then an ideational or interpretative stage · the two stages overlap and merge into a single momentary and apparently sensuous consciousness of *seeing*, of *hearing*, etc., which we call a percept or an intuition.

The reasons of this merging or fusing of the two factors into the peculiar form of a percept have already been suggested. It is evident that we have here to do with associative cohesion of the highest degree of strength. The conjunctions of our sense-experience, *e.g.*, the visual marks of smoothness (lustre, etc.) with the corresponding tactual consciousness, are among the most constant and most frequently renewed. But, again, the relation of the two associated factors in perception is a peculiar one. On the one hand the actual sensations are often of very little interest to us on their own account, and are attended to merely as signs of that which is of real moment. Hence a tendency to slur over the sensation and hurry on to the ideational significate, as in realising the tangible smoothness of a billiard ball when looking at it. This is an illustration of the general principle that attention moves *from the less to the more interesting* (*cf.* above, p. 88). While, however, the ideational element is thus reinstated and made prominent, the sensational element not only persists just because it is sensational, but gives to the whole psychical state its peculiar character, *viz.*, vividness and directness.

Definition of Perception. By aid of the foregoing brief analysis we may define perception as follows. Perception is a process of psychical elaboration, involving both presentative and representative elements. More particularly, perception is that process by which the mind, after discriminating and classing a sensation or sensation-complex, supplements it by an accompaniment or escort of revived sensations, the whole aggregate of actual and revived sensations being integrated or solidified into the form of a percept, that is, an apparently immediate and sensuous apprehension of an object now present in a particular locality. This definition may be accepted provisionally. We shall be better able to judge of its appropriateness after we have carried our analysis of the perceptual process a stage further.

Physiological Conditions of Perception. It would seem to follow from this definition of perception that it involves an extended cortical process. To begin with, inasmuch as perception involves a certain persistence and intensification of the sensation, it will always call into play the motor apparatus which, as we have seen, is the special mechanism of attention, and more particularly include those muscular adjustments by which distinct sensations are obtained. Further, as we shall see presently, perception of locality always involves a certain motor process, as when we hear a sound and experience an impulse to move the head in the direction of the sound. In addition to such motor elements, perception involves, as its nervous substrate, an extended area of sensory excitation. Thus the perception of the sounding bell by the ear manifestly implies that the centre of audition is co-ordinated with other centres, and more particularly the optical and tactual central tracts. Lastly, it is to be noted that the close implication and partial coalescence of the representative with the presentative element in perception is presumably correlated with the fact of a perfect co-ordination of the cortical tracts engaged, as a result of which the whole process of excitation takes on the form of a single and approximately instantaneous nervous action.

Special Channels of Perception. It has been observed that every sensation is interpreted by an act of perception, or, in other words, is worked up as an element into that complex mental phenomenon which we call a percept. Thus we refer sensations of smell to objects as when we say: 'I smell violets,' just as we refer sensations of light and colour to objects as when we say: 'I see a candle'. Nevertheless, when we talk of perceiving we generally refer to knowledge gained at the time through one of the higher senses, and more particularly sight. To perceive a thing means in every-day parlance to see it. Where sight is wanting touch assumes the function of the leading perceptual sense. Sight and touch are thus in a special manner channels of perception. Hearing, though it has an important *rôle* as a perceptual sense, will be found to be distinctly inferior to these.

The reason why the senses of touch and sight are thus distinguished has been hinted at in a previous chapter. We there saw that they were marked off from the other senses by the possession first of all of a system of clearly-defined local differences, and secondly of an exceptional variety of muscular experience. Owing to these circumstances these two senses supply us with a wider and more varied knowledge of objects than the other senses. In smelling a flower I can only apprehend one aspect or quality of a thing, its odour: in looking at it I instantly take in a number of aspects, as its colour, shape, and size.

The additional knowledge, moreover, gained by means of the fine local discrimination of the skin and the retina, together with the accompanying movements, is of a most important kind. To begin with, what we mean by perception in its simplest form is, as pointed out, localising or referring a sensation to a point in space. Now it is only touch and sight which can give us directly any considerable knowledge of space, of the situation of objects with reference to one another and to ourselves.

By means of these same endowments touch and sight can make known to us the space-qualities or 'geometric' properties of bodies, *viz.*, figure and magnitude. With these space-properties of bodies must be coupled the 'mechanical' or force-properties, that is to say, resistance under its several forms of impenetrability, weight, etc., as made known by active touch.

Now these qualities are of much greater importance than those made known by the other senses, such as the taste of a substance and the sonorousness of a body. We may be said to know more about an object when we have ascertained its shape or size than when we have heard its sound.

The superior importance of such qualities as size, figure, and weight turns on a number of considerations. To begin with, all objects exhibit these attributes. What we mean by a *thing* or a material body is constituted by figure, size, hardness and weight, etc. On the other hand, there are many things which have little or no smell or taste. Again, the former qualities are comparatively speaking constant or unchanging in the case of the

same object. A stone is always the same as to its size, hardness and weight. On the other hand, a body is only sonorous when put into a particular condition of vibration, and a fragrant substance varies considerably in the degree of its fragrance according to circumstances. Once more, different persons agree very much more respecting the size or weight of an object than respecting its taste or smell: the former impressions vary less with the state of the individual organ than the latter. Hence the former aspects of objects have been erected into a higher class under the name of 'Primary Qualities,' while the latter have been marked off as 'Secondary Qualities'.

(A) Tactual Perception.

Characteristics of Tactual Perception. Although, as has been observed, what we commonly mean by perception is seeing an object, touch (by which we mean active touch) must be regarded as an important channel of perception, especially in early life. We obtain by means of this sense a larger amount of important knowledge respecting objects than by any other sense. The bulk, figure, hardness, weight of a thing are directly known to touch. Hardness and weight are known only to this sense, and these qualities are obviously an important part of what we call *material* objects, or bodies. Hence we find that those who are born blind, and so thrown upon touch for nearly all their knowledge of material objects, acquire a wealth of information which astonishes the seeing man. Hence, too, the fact that even in the case of normal persons the sense of touch seems of all our senses to bring us into the closest relation to external things. It is for all of us the sense to which we make appeal when we want to be *certain* of a thing being present. We call a thing of whose reality we are sure something 'tangible'. Further, observation of children tells us that touching things is the way by which all of us have, in the first instance, come to know them. Hence we shall do well to study the process of perception first of all in this fundamental form. In order to understand this process we must, it is evident, suppose sight to be absent, as in the case of the blind.

Tactual Perception of Space. As already remarked, we may come to know about the various localities of our body, as also the positions, distances, etc., of extra-organic objects, by help of active touch alone. We have now to inquire how these tactual space-intuitions arise.

We here set out with the supposition that when the baby first touches a surface, say that of its mother's body, it has not a space-consciousness such as a grown person would have in like circumstances. What this primitive consciousness amounts to we can only form a very vague conjectural idea. As pointed out above, there would be something in the experience answering to extensity or spread, though this would probably not at first be differentiated from intensity. Whatever this amounts to, it seems certain that other elements must be added to, and integratively interwoven with, this primal "bigness," before our [illegible] space-consciousness becomes possible. This new element is supplied by motor experience, that is to say, the sum of those muscular sensations, and groupings of muscular sensations, which attend movements of our limbs.

This being so, we may best begin our genetic account of the tactual space-consciousness by inquiring what modes of consciousness having a spatial or *quasi*-spatial character our motor experience yields us. Having considered these apart, we may go on to trace out the effect of their combination with those aspects of passive touch which we have marked off as extensity and the correlated local differences of sensation.

(*a*) **Limb-Movement as Source of Space-Consciousness.** In order to understand the help given by movement we will make the fanciful supposition that the child has, instead of an extended hand, only one finger-tip, so that he is able to have only one tactual sensation at a time. This sensitive point he would carry from one point of space to another just as the insect can carry one of its antennæ.

Every movement which he would thus perform is, as we saw above, accompanied by a continuous series of changes in certain groups or complexes of sensation. This series, as soon as it becomes

attended to as a whole, constitutes his first rough consciousness of that movement. The character of this series of sensation-changes will, as pointed out, vary according to the direction of the movement. Thus in carrying his finger from his breast to a point a little in front of him, say the edge of a table, he has one distinctively-coloured series of sensation-changes.[1] Moreover, a movement having a range of two feet will plainly give rise to a different (that is, longer) series from that of another movement of the same direction having only half this range.

Owing to the action of the primary law of retentiveness the preceding members of the series would persist along with, and overlap, the succeeding. Accordingly, when the movement was completed, and the limb brought to a standstill, the group of sensations answering to this position would be supplemented by the representative *residua* of the preceding members of the series. This combining of the surviving traces of the earlier sensations with the final sensation involves a measure of that complication of presentative with representative elements in which the perceptual process consists. Hence we may say that it would supply the materials for a rudimentary *perception* of a movement of a given direction and range.

In this way, then, a sensation of contact would be (extra-organically) localised by being attached as immediate consequent to an experience of movement. In other words, the child would begin to say, 'I touch something *there*,' because he would begin to realise that the sensation of contact follows and depends on a movement of a particular direction and range away from his own body as starting-point.

This series of sensations would become solidified, and the resulting perception more complete, by repetitions of the movement. Each time the child executes this particular movement he would experience the same sequence of sensations; and in this way they would become more firmly coherent, and grow solidified into one indivisible whole.

[1] It is assumed that the point from which the explorer sets out is some ill-defined area of the chest.

Such mere successions of sensation would not, however, give our imaginary child any perception of space as made up of *co-existent* points or positions. A step would be taken towards a vague apprehension of such spatial co-existences by further variations of the motor experience Thus the effects of changes in velocity would prove instructive. By varying the pace of the movement the child finds that the duration of the several distinguishable sensations, and of the series as a whole, becomes shorter or longer. The interval between the initial and final sensations, answering to the initial and final positions of the limb, varies indirectly with the amount of energy thrown into the muscles. In this way the series would come to be recognised as a fixed order in time, *the duration of which can be varied indefinitely.* And this would serve to differentiate the motor succession from an ordinary time-sequence, such as that of sounds.

A new and much more important element would be added by the experience of reversing the movement. In carrying his finger from a point B, say on the edge of a table immediately in front of him, to his starting-point A, his own body, the child has a different experience. New antagonistic muscles are here called upon to contract, while those previously contracted are relaxed. At the same time the sensations answering to the successive positions of the hand (so far as they depend on changes of pressure on skin and joint, and also on the ratio of the activities of the opposed muscles) would be the same as before, only the order would be reversed. This fact of *reversibility* would serve in a much more effectual way to differentiate the complex motor experience from a mere succession in time, if not to suggest the idea of spatial co-existence or co-extension.

By repetitions of this complementary pair of movements, together with other complementary pairs corresponding to other points of space, the child would gradually acquire motor experience answering to the several regions immediately environing him, and these acquisitions would later on be supplemented by the addition of the movements of a second arm, and, what is still more important, of leg-movement or locomotion.

In very much the same way as he finds out the relative situations of different objects, such as the several pieces of furniture in a room, the child might discover the shape and size of an object. Thus he could pass his finger over a book-cover in different directions. In so doing he would have not only two tactual sensations at the beginning and end of his excursion, as he had before, but an unbroken series of tactual sensations accompanying the series of motor sensations. And this new experience would bring into view the distinction between empty space as mere *room* for movement (*cf.* German Raum) and *occupied* space, or space as bounded and hemmed in by an extended and resisting surface.[1]

In this case, too, by varying the velocity of the movement, by reversing it, as also by executing a number of movements in different directions, he might possibly reach a rudimentary perception of a fixed order of tangible points or an extended surface. The range of this touch-accompanied movement in different directions would determine his idea of the figure and size of this surface. This perception would be rendered still more distinct by passing the finger along the outline or contour of the surface.

In this way a dim apprehension of what we mean by the space-order might be obtained by movement alone. What this would amount to, however, it is impossible for us to conceive. Everybody's tactual acquaintance with space is gained by help of the extended surface of his skin including that of the hands, with the correlated local differences of sensation at this and that point. Thus, when an object comes into contact with any part of the body, we instantly know of its whereabouts through our apprehension of the particular locality of the skin acted on. So, in spreading the hand on an object, we instantly recognise the relative positions of its several parts through a localisation of the several tactual sensations at the corresponding skin-points. This definite localisation of skin-sensations is here assumed to be acquired, and acquired by means of experiences of movement. It remains to

[1] We see from this that the development of the perception of space is closely connected with that of the apprehension of materiality or resisting impenetrable substance. This connexion will be brought out later.

show how this grafting on to the original (local) differences of definite local *significations* by the agency of motor experiences may be brought about.

(*b*) **Localisation of Skin-Sensations.** And here we must bring into view what we have hitherto left out of sight, *viz.*, the fact that the child explores his own body, or rather the accessible regions of it, just as he explores bodies external to it. Thus, setting out from the same hypothetical starting-point, the level of his chest, he carries his finger-point now to his mouth, now to his other hand, now to his foot, and so forth, and by touching the particular part he excites in it a sensation having a peculiar local character.[1] These movements are for the same parts of the body (so long as *they* do not move) the same in respect of direction and of range. In this way experience serves to connect with each of the original (local) differences among the skin-sensations a definite experience of movement, and such an association would, it is evident, serve to give not only greater definiteness of character but also a new significance to the primitive difference.

Other motor experiences would co-operate in thus rendering definite and spatially significant the primitive differences of the skin-sensations excited at different points. Thus, movements over the skin from point to point in different directions, varied in velocity and reversed as already explained, would serve to render much more definite the spatial relation of one skin-point to another. In this way the left eye would be recognised as left in relation to the right by movement from the latter in what we know as the left direction. Again, movements of a dermal surface over a fixed object-point, as in sliding the palm of the hand over the stationary extremity of a pencil, would still further subserve the translation of the primitive local differences of sensational character into motor differences.

In these various ways the obscure differences among the sensations answering to the several distinguishable skin-points

[1] It is assumed here that the primitive movements referred to are carried out without aim. The nature of these 'random' movements will be explained more fully by-and-by.

would become spatially defined by being complicated with clearly-distinguished motor experiences That is to say, all sensations arising from a particular point P on the skin would now be transformed into complexes, in which the presentative tactual element (with its original local character) has become overlaid and fused with a group of representative elements.[1]

(*c*) **Simultaneous Perception of Points: Tactual Intuition of Surface.** As soon as this localisation of skin-sensations at different regions of the body is learned, the tactual perception of surrounding space, and more particularly of the extended surface of objects, will take on a more definite and perfect form. When the child now spreads out his hand over a surface, say the book-cover, he will no longer get merely a vague sense of bigness or 'extensive magnitude,' but a system of touch-impressions, each of which has a separate and distinct local significance. By such a simultaneous group of definitely-localised touch-sensations the knowledge of space as made up of parts co-existing side by side would be rendered far more distinct. For the first time the space-order would now be clearly differenced from a mere time-order, or a renewable and variable *succession*. We may say, then, that *the tactual perception of space is a product of two factors, viz., muscular sensation proper and certain discrete contact-sensations which acquire spatial significance through association with movement.*

(*d*) **Other Modes of Space-Perception: Solidity, etc.** It has already been pointed out that the tactual perception of space includes a complete apprehension of it in its three dimensions, that is to say, of depth of space or distance from the observer, as well as the two surface dimensions. In moving the hands away from and towards a fixed point in his own body, the child discovers the direction and distance of objects relatively to this starting-point. Similarly, by passing his hand along a reced-

[1] If we let s stand for any sensation received by way of the point P, π for the primitive local character, and m for the representation of a definite movement, or group of movements, we may say that the sensation is now symbolised by the complex of symbols $m\pi s$.

ing object, say the horizontal surface of a table, he would acquire a perception of its several parts as nearer and further, advancing and receding.

The appreciation of the third dimension enters into the perception of the solidity or bulk of objects. Thus a blind child would estimate the receding direction of a table by movements of the hand over its surface away from his body. A more definite and complete perception of solidity would be gained by help of simultaneous tactual sensations. Thus, in the case of a very small object, as a ruler, a child can grasp it with one hand; if larger, as a ball, he can clasp it between his two hands; if still larger, as a cushion, he can fold it within his arms. In so doing he experiences a multitude of touch-sensations which are instantly localised with reference one to another, and along with these a number of muscular sensations which immediately make known to him the bent position of his hands and arms. And thus he reaches at once a clear perception of the object as a solid or cubical body, having bulk.

It is evident from this that the formation of the human hand and arm, with the possibility of grasping and enfolding movements, is all-important for the development of the perception of solid objects. It is probable that other animals, as the bear, the elephant, and pre-eminently the monkey, endowed with the necessary grasping organ, acquire a measure of this knowledge; yet this is presumably greatly inferior to that reached by man.

Closely connected with the perception of space is the discrimination of unity and plurality of objects. In general we may say that a single object allows of, and can be known by, continuity of surface, and a complete contour. Thus, a child knows his ball or his book as one object by passing his hand about it and finding out the continuity and enclosing character of its surface. In the case of a plurality of objects, on the other hand, there is no such continuity, or single limiting contour. In passing the hand from one toy-brick to another the child has its sensation of contact interrupted.

Experience would help to perfect discrimination by supplying

a knowledge of the relative positions of points of the bodily surface, and of the alterations of these by movements of the organs, as in bending the fingers, or bringing the hands together. In this way the child would learn to interpret the double sensation of contact of two opposite skin-surfaces, *e.g.*, the anterior surface of thumb and the fingers, or the two palms, as answering to one solid object. On the other hand, he would in general ascribe two simultaneous impressions of contact by way of non-opposed surfaces, as the palm and the back of the hand, to two objects.[1]

Along with these perceptions of space, and of one and many objects in space, the child would gain the perception of things as moving, or as changing their position. This would take place by following the moving object with the hand. The perception of 'objective,' as distinguished from 'subjective movement' (that is to say, of the movement of the object, and not simply of the hand), would be based on two distinctive characters of the experience. First of all, in following a moving object with the hand he would experience one uniform touch-sensation, and not a change of tactual sensation with faint sensations of resistance and obstruction of movement, as in the case of moving the hand over a surface; and, in the second place, he would in the former experience recognise that the direction and velocity of the movement were determined *for* him, and not *by* him, as in the latter experience. The full recognition of the movement as such, *i.e.*, as a change of position, would only arise as the tactual space-perception developed.

Perception of Material Quality: Impenetrability. Closely connected with the perception of space, and developing concurrently with this, is the perception of material quality, impenetrability or corporeality. This perception, in its various modes, as that of hardness, is derived from a peculiar variety of

[1] This tendency is illustrated in the familiar experiment of crossing two fingers, as the third and the fourth, and placing a pea or other small object between them. Under these circumstances we seem to be touching *two* objects, because we are getting impressions by skin-areas which *under normal conditions*, *i.e.*, when the fingers are not crossed, are 'non-opposed'.

muscular experience. A child comes to know that the table is a material substance by pressing its hand against it. Here there are certain muscular sensations due to the process of contraction, accompanied by sensations of pressure, which last increase directly as the sensation of muscular tension increases. The initial volitional impulse does not in this case issue in the experience of movement, but of impeded or thwarted movement or of resistance. We may say, then. that the fundamental experience underlying the perception of material reality is that of *thwarted impulse to move, or of obstacle to movement.*

Now, a like experience of arrested movement, and of pressure varying with the effort, occurs when two of our own moving organs, say the two hands, oppose one another. And in this case it is evident that we have a sense of muscular exertion or strain in each of the two members. When a second person opposes our movement we attribute to him an analogue of that active consciousness of which we are the subject when we obstruct our own movements. And it seems highly probable that even in the case of inanimate objects, when the child refers the obstruction of his movements to something real and external to himself, he is carrying out a similar mode of inference. In other words, he finds the explanation of his arrested action in the opposing action of a "force" analogous to that which his own active consciousness suggests to him when he himself arrests the action of one limb by that of another.

This perception of material body or reality becomes specialised in a number of modes, according to certain variations of the experience. Thus the difference between hard and soft, and the difference, so far as made known to active touch, between a rigid solid and a fluid, turn on the fact that increase of muscular effort is now futile, giving rise only to increased sensation of pressure, and is now productive of movement accompanied by sense of obstacle or friction. Similarly, the difference between a non-elastic and an elastic substance, as clay and india-rubber, turns on the difference in the reaction. An elastic body is that which will yield to effort, but at the same time maintain its resistance

under the form of a tendency to recover its former position or shape.

Connexion between Ideas of Body and Space. Although, for purposes of clear exposition, we have traced out the development of the perception of space as if it preceded that of material body, we have to remember that the two are mutually implicated and develop *pari passu*. The child does not first find its way to an intuition of empty space and then begin to mentally place objects therein. The rudimentary idea of body gained by touch and muscular effort is quite as early as the first idea of space gained by movement and touch. Each perception grows distinct, partly by opposition to, partly by the assistance of, the other.

It has been already pointed out that contact following upon movement serves to define the boundary of the latter. And this it does by a sharply-contrasting experience, *viz*, that of free movement and the arrest of movement or of resistance. By finding its arm-movement suddenly brought to an end by contact with something hard or resisting, the child gains a first crude knowledge of the distinction between empty and occupied space (vacuum and plenum), or between space as room, and resisting body in space.

But not only do the two perceptions define one another by way of opposition, they aid one another's development. Thus it is the experience of resistance, giving, as explained above, a rudimentary knowledge of materiality or body, that serves to invest space with its outness or externality, that is, its independent reality. This is manifestly so in the case of touching objects and gaining a knowledge of their figure and size. The perception of a surface as made up of a system of co-existing parts involves the idea of a certain extent of resistance corresponding to a certain range of movement in various directions. In other words, extension as an attribute of real bodies derives its external reality from its close and inseparable association with the experience of resistance. And since, as we have seen, the perception of (empty) space is definitely related to, and conjoined with, that of resisting objects, it can easily be understood how much the whole

perception of space or extension owes to that of material reality or body.

Other Modes of Tactual Perception. Closely connected with the perception of material quality or impenetrability is that of Weight. This, too, involves a sensation of contact, and (when the supporting hand or other member is not itself supported) the muscular sense. In estimating the weight of a small body, as is our custom, by lifting it in the hand, we find that the heavier the body the greater is the exertion required to support it (as measured by the muscular sensations), as also the attendant sensations of pressure. Great weight means much muscular strain, *i.e.*, intense muscular sensations and correspondingly intense sensations of pressure. The co-operation of this last factor with muscular sensation is seen conspicuously in lifting a body by means of a string, when increase of pressure, acting now on a smaller area of the skin, makes itself felt by a distinctly painful sensation.

Another important tactual perception of quality is that of roughness and smoothness of surface in their several degrees. The roughness of a surface, as that of a piece of undressed stone, may be recognised to some extent by merely laying the outspread hand on the surface. In this case the perception of roughness arises by means of the different intensities of the sensations of pressure received by way of different points of the hand, and definitely localised in these points This experience at once suggests inequalities of surface, projecting and receding points. But the perception is much more distinct when the hand moves over the surface. In this case the unevennesses make themselves known as impediments to movement. A rough surface is thus one which offers resistance to movement over it, whereas a smooth surface, as that of marble, is one over which the hand glides easily.

Integration of Tactual Perceptions: Intuition of Thing. By means of the several experiences of Active Touch here described, a child receiving no help from sight might, as we know from the observation of those born blind or who very early lose their sight, acquire a clear apprehension of what we mean by

a thing or object. A word or two must suffice by way of showing what this involves.

First and foremost, then, in such a child's tactual intuition of object would be *the conjoined perception of spatial quality* (position, figure, and size), *and of materiality.* The first crude idea of object would be the experience of a continuous system of resistances definitely localised. Thus the child's ball as object makes itself known primarily as an integrated cluster of experiences of movement (towards the object and over its surface), contact, and resistance. And these several elements are recognised as related to one another in a definite way. Thus movements towards the object are followed by the sensations of contact, which, again, are accompanied by the experience of thwarted movement on the continuance of the muscular action.

The perception of other qualities, as roughness of surface, temperature, becomes combined with this fundamental perception and so taken up into the intuition of thing as a whole. This involves the reference of the corresponding sense-experiences to the same locality as the resistances. Thus the child projects the sensation of cold and of smoothness into the thing, the marble, because they occur, along with the sensations of touch and resistance, in close connexion with, and dependence upon, certain definite movements. *The perception of an object as a unity is thus primarily determined by a reference of its several qualities to one definite region of space and the connected fundamental experience of material substance or reality.*

The apprehension of thing grows more distinct by the development of the knowledge of *persistence* or continuity in time. This implies repeated experiences, and a discovery of certain constant elements and relations among these. Thus, as long as the object remains where it is relatively to the child, the group of experiences underlying the apprehension of its qualities will recur as often as certain movements, stretching out the hand, lifting, etc., are carried out.

The apprehension of persistent object is further aided by the experience which the child obtains in connexion with his own

body. This is not only an object which is always present to some extent to touch: it discloses its persistence indirectly through the persistence of the sensations connected with, and localised in, its several regions. It is probable, as we have seen, that a child mentally fashions other objects on the model of his own body, endowing them with sensations analogous to his own; and if this is so, we can understand the more readily how he comes to attribute persistence or continuous existence to these objects.

The full knowledge of unity and persistence of object presupposes the experience of the movement of ourselves and of objects, and the attendant changes of position. The cluster of qualities composing an object only becomes clearly discriminated from other clusters by movement. Thus the spoon becomes isolated as a single object when it is found that it yields the same group of experiences whatever its local relations to the cup and other objects. The same experience of movement and change of position would extend the idea of persistence by showing that objects continue to exist *somewhere* after changing their position. It is highly probable that, to the infant mind, the disappearance of an object is tantamount to its annihilation. It is only a wider experience, familiarising it with changes of locality, which enables it to reach the idea of persistence, or identity of object as we understand it.

Such a tactual intuition as that described would supply a sufficient means of distinguishing and recognising objects apart from sight. Thus a blind child, by the complex of experiences gained on touching an orange, is able to recognise the object *as an orange*, thus reinstating by means of active touch other sense-experiences, as those of smell and taste.

This tactual intuition involving a complex group of sensations would be a highly *presentative* mode of perception. We have now to pass to a mode of perception where the representative element is much more preponderant over the presentative than in the case of tactual perception.

(B) Visual Perception.

Tactual and Visual Perception. While, as we have just seen, tactual perception is the most direct mode of apprehending

things, it is limited in its range at any one moment. Our imaginary blind child would be able to perceive directly at any one time only a small portion of the external world, namely, those objects which were within his reach and capable of being simultaneously touched.

Visual perception stands in marked contrast to this direct but limited mode of apprehension. In normal circumstances seeing is, as has been remarked, the customary mode of perception. It greatly transcends touching in the range of its grasp of external things. Thus in vision we apprehend objects not only near us, but at vast distances from us, such as the heavenly bodies. Again, by sight we are capable of apprehending in a single moment a wide field of objects in different directions and at different distances from us, that is to say, a whole region of the external world.

The predominance of visual perception is illustrated by a number of facts. In smelling, tasting, or touching an object which we do not see, the corresponding visual presentation (visual form with colour more or less distinct) is instantly recalled. Similarly a name always suggests to our mind first of all, and most irresistibly, the visual appearance of a thing. And this holds good with respect to objects which are of most interest to us in relation to other senses. Thus the word 'bell' calls up the bell-form before the bell-sound, the word 'orange,' the particular form and colour of the fruit before its taste.

The resources of sight, more particularly the capability of the retina of receiving a multitude of finely differentiated local sensations, and the delicate movements of the eyes, enable this sense to develop a highly-complex mode of perception of its own. A clear understanding of the true function of sight as a means of perception will, however, compel us to adopt the idea first clearly set forth by Berkeley, that in seeing objects in space the sense of sight is greatly aided by that of touch.

We will first trace out the development of an independent Visual Perception. After this we may study that more complex mode of perception which arises through the associative integration of experiences of Touch and Sight.

Visual Perception of Space. Here, as in the case of touch, we set out with the supposition that there is a primitive appreciation of extensive magnitude and a discrimination of plurality of sensations. Our visual idea of space, position of objects, and so forth, is obtained by help of the retinal discrimination of these. At the same time, this primordial distinctness of sensation answering to different retinal points only takes on a definitely spatial or local significance by the addition of movement.

In order, then, to understand the development of the visual perception of space, we may proceed, as in the case of tactual perception, to inquire into the nature and results of the experiences immediately connected with movements of the eyes. And for the sake of simplifying the problem we will suppose that a child has but one eye, and that this eye has but one sensitive retinal point, the yellow spot or area of perfect vision.

(*a*) **Ocular Movement as Factor in Space-Consciousness.** The eye is capable of rotating in various directions, as to the right, upwards, and so forth, all such movements being resolvable into rotations about three axes, *viz.*, a vertical axis, and two other horizontal axes. These movements, which are executed by means of a system of six muscles, serve to bring the yellow spot opposite to different points of the field. This is commonly described as turning or directing the line of vision (*i.e.*, a line deviating slightly from the optic axis) from one point to another.

In performing any particular movement our imaginary child, moreover, would experience a series of sensations analogous to those experienced in carrying the finger-tips from point to point of space. Thus in moving the eye from a point A in the field of vision to a point B to the right of it he would experience a series of sensations of movement of a definite character. Here, too, the final sensation, answering to the position of the eye at the close of the movement, supplemented by the representation of the preceding members of the series, would supply materials for a rudimentary perception of movement of a particular direction and range, and in this case, as in that of arm movement, changes of

velocity, and reversion would aid in developing the consciousness of a spatial order.

In this way the child might explore the field of vision or map out the several positions of visible points on a plane surface, or in space of two dimensions. In a similar manner by passing the line of vision over the surface of a body in different directions, and about its contour, he would acquire a vague knowledge of its extension and the form and magnitude of the surface.

(*b*) **Simultaneous Retinal Perception.** Let us now suppose the child's eye to be supplied with its extended retinal surface, and its innumerable nerve-elements, together with the correlated extensity and plurality of sensations. The movements just described would now serve, as in the case of touch, to develop this primordial discrimination into a true appreciation of locality or position in space.

It is evident that, being thus endowed with a retina, our little explorer in carrying the axis of its eye from one part of the field to another would not instantly lose sight of a point as soon as his eye passed on to another, but would continue to see it in what is called indirect vision. Thus, in moving from the centre to a point on the circumference of the wheel, the retinal image of the former point would slide over a succession of retinal points. That is to say, the child would continue to receive the impression of this point (with decreasing degrees of distinctness), varied, however, by a succession of distinct accompaniments in the shape of the original differences of sensation corresponding to distinct retinal points. In like manner, the point of the circumference towards which he was moving would be seen 'indirectly' (with increasing degrees of distinctness) before the eye was fixed on it in 'direct' vision.

This conjoined experience of ocular movement and of varying (retinal) impression would lead to the ordering of visual sensations in space much in the same way as in the case of manual movement. Let us imagine any point P lying on the retina to the right of the centre C and having its own original difference of local colouring, say π. Then, if we suppose the eye to be

moved at first aimlessly or at random,[1] it would happen that the sensation πs answering to P would be transformed into a distinct sensation, say cs, whenever the line of vision chanced to move in the required way, so as to transpose the retinal image to the yellow spot. By such motor experiences the child finds out that all sensations having the original local aspect π can be brought up to the point of maximum distinctness by carrying out a movement (either of the eye or of the head) of a particular direction and range. As a result of this there is now developed a tendency, on the recurrence of a sensation πs, to move the eye in the required direction. Thus on seeing a light enter the room to the left of the field he tends to move his eyes (or his head) a certain distance to the left. And this shows *that all sensations corresponding to this particular nerve-element are now accompanied by a representation of the movement necessary to a fuller realisation of them in direct vision.* This addition of the representation of a definite movement would serve to give the sensations a special local significance.[2]

Through numberless variations of these movements in different directions, the visual impressions corresponding to the other retinal points would be similarly localised with reference to the central point of the field, and also with reference to one another. As a result of these integrative associations our child would now be able with his eye at rest to apprehend or take in simultaneously an extended field of objects, the various points of which are instantly localised, one above or below another, to the right or to the left of it, and at a certain distance from it. As a

[1] How far the primitive movements of the eye here referred to are, strictly speaking, random, is a matter of dispute. According to some, an impression received by way of a point on the peripheral portion of the retina tends originally and by means of reflex arrangements to excite a movement which would bring the yellow spot opposite the object. According to this view, localisation of retinal sensations is in a measure instinctive.

[2] Here, too, the integrative complication of the sensation s may be represented by the group of symbols $m\pi s$. It is to be noted that the movement represented is much more definite than in the case of touch.

further consequence the form and size of an object would be recognised 'at a glance,' and without carrying out any movement at the moment. The delicacy of the eye's perception of form corresponds to what we know of the local discriminative sensibility of the retina, as also of the discriminative muscular sensibility.[1]

The simplest element in the visual appreciation of magnitude and form is that of linear magnitude, which is particularly fine. Next to this is the discrimination of the direction of lines, which shares in the delicacy of that of linear magnitude. The appreciation of contour in the case of a rectilinear figure, as that of an oblong or triangle, proceeds by noting length of line, direction of line, as well as the amount of change of direction at the corners (magnitude of the angles).

The other principal element involved in the appreciation of form is *relative* magnitude or proportion among dimensions. In ordinary vision we do not note with any close attention the absolute magnitude of an object. But we note very carefully the relative magnitudes, *e.g.*, that of the two sides of a rectangular figure, or of the two arms of a cross. This is illustrated in many familiar errors of visual measurement. In the accompanying drawing, Fig. 6, the vertical line *a'b'* looks, on a first glance, longer than the line *ab*, because of the striking difference of length of the two horizontal lines to which we see them respectively related. A similar effect is still more apparent in Fig. 7. Here the two sections of the line *ac*, *viz.*, *ab* and *bc*, look equal, though *bc* is really shorter than *ab*, the explanation being that we cannot help seeing the length *bc* as a whole *in relation to its divided parts*, and so *too* large.

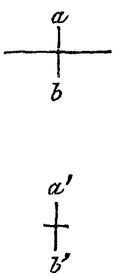

FIG. 6.

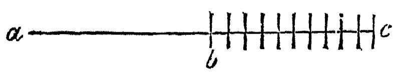

FIG. 7.

[1] It is uncertain as yet what is the exact part taken by each factor in the finer measurements carried out by the eye.

Binocular Perception of Space. Under normal circumstances we see with two eyes. These must be regarded as a single organ. Numerous facts show that the perception of space has been developed by the habitual exercise of them in co-operation.

The co-operation of the eyes in vision differs from that of the two hands in touching. These last double the area perceived at any one moment. When, however, we look at an object with the two eyes a large part of the field of view is common to both. They are both fixed on the same central point (point of fixation, German *Blickpunkt*), and all the central portion of the field is seen by each. The sweep of the field is only increased to some extent at the two sides, to the right by means of the right eye, and to the left by means of the left.

If we keep to one and the same plane we find that both the portions of the field common to both eyes as well as those peculiar to each are, in general, not seen as double but as single. That is to say, we see one single field or one continuous scene. If, however, the object is considerably nearer or further off than the plane of the particular object that we are fixating, we have what are called double images. Thus, on steadily looking at a distant object, a pencil brought just in front of the nose appears double. In general the impressions of the two retinas coalesce in single impressions when the retinal images fall on what are known as "corresponding points,"[1] *viz.*, the two centres (answering to the point in the visual field which is fixated) and all pairs of points situated similarly (*i.e.*, on the same side and at the same distance) with respect to these; and when they fall on non-corresponding points they are seen double. At the same time, as will be seen presently, there are certain exceptions to this law.

Co-ordination of Tactual and Visual Perception. Thus far we have traced the development of the eye's perception of space as an isolated process. That is to say, we have supposed that by means of the experience supplied by the retinal sensations,

[1] Strictly speaking, these are known as "identical points". The "corresponding points," the impressions of which are found actually to coalesce, deviate slightly from these.

together with those of the ocular muscles, a child would learn to map out spatial arrangements in two dimensions without any assistance from another sense.

This supposition seems on the whole justified. There is good reason to think that either sense develops, to some extent at least, its own spatial consciousness, apart from the other. At the same time, another process is going on from the beginning. The child is not only noting the visual changes which result on moving his eyes, he couples with these the lessons of his tactual experience. Thus, even with respect to the relative situations of a system of visual points in two dimensions, movement of the limbs and touch are from the outset coming in to modify the visual experience. This seems to be clearly illustrated in the different significance which we have learnt to attach to the *look* of a vertical and a horizontal line, a difference which enters into architectural effect.

It is time, however, to abandon our supposition that the eye is engaged merely in arranging a system of points in two dimensions. When we look out into space we see the situation of points not only in relation to one another but in relation to our own position. One point lies away to the left of us, while another lies to the right. One part of the scene is further off from us than another. That is to say, we see things in a space of three dimensions, having depth or distance. This apprehension of the third dimension necessarily reacts on the perception of the visual field. For it is obvious that the real distance one from another which we ascribe to any two points depends on the distance from ourselves which we attribute to this field. It is in this fuller and concrete perception of space by the eye, the perception we all know, that the co-operation of tactual perception is most apparent. We have now to trace this more complex process of tactuo-visual perception.

The movements of the eyes are incapable of giving us the direct apprehension of depth afforded by arm-movement. As Berkeley pointed out, we cannot send these out into space, but only roll them about in their sockets. We do, indeed, move them differently when we merely transfer them from one point to another on a surface, and when we move them from a further to a nearer

point. In the latter case the two eyes are made to converge. But this difference would not of itself make known the fact that one object was nearer than another. The child has to recognise the situation of objects with respect to himself by a reference to his experiences of actual touch.

Perception of (Absolute) Direction. By means of ocular movement supplementing retinal discrimination a child perceives the *relative* direction of points lying in the field, that is, their situations relatively to one another (above, to the right, etc.). But he does not recognise the *absolute* direction of an object, that is to say, its situation with reference to his own position. This mode of perception has reference to something outside visual experience, *viz.*, arm-movement away from the body. This extra-visual experience of direction is suggested to the child by means of certain visual signs. The chief of these is the position of the eyes at the moment, as made known by the muscular sensations connected with the condition of the ocular muscles engaged. In 'fixating' or looking at a point to the right of us the state of contraction of the muscles concerned and the accompanying sensations are different from those which arise when a point to the left is looked at. For every change in the direction of vision there is an accompanying change in the concomitant muscular sensations. Along with these sensations of the ocular muscles must be taken those of the muscles of the neck concerned in moving the head to the right and to the left, upwards and downwards.

The co-ordinating or associating of these ocular sensations or signs with the arm-movements signified is the work of experience. At first the child, on seeing and fixating an object, makes no attempt to reach out the hand and touch it. Later on, somewhere about the third month, we may observe the hand to be stretched out to touch the object seen. It is only after some months that the association is perfected so that he aims correctly and touches the object instead of passing by it.

Perception of Distance. It is this aspect of visual perception which has received most attention from English psychologists. According to the common view, first propounded by

Berkeley, seeing the distance of an object is the interpreting of certain visual signs, which are in themselves as destitute of meaning as word-sounds, and like these acquire all their meaning by the teaching of experience, that is to say, by association with data of active touch (sensations of movement and of contact).

What is meant by the distance of an object, its remoteness from our own body, is, just like its absolute direction, ascertained by means of arm-movement, or, in the case of greater distances, by this supplemented by leg-movement. When we look at an object, say a shop across the street, and 'intuit' its distance, we represent the amount of movement (as made known by the attendant muscular and other sensations) needed to bring us up to, or in contact with, the object.

Sight, though it does not give us the experience underlying the idea of distance, supplies us with certain variable signs of this. In the case of monocular vision these signs are the muscular sensations attending the varying degrees of accommodation of the eye, that is to say, the greater or less degree of convexity of the eye-ball (or lens) for different distances. In looking at an object a few inches from the eye the muscles concerned in this process are contracted much more than in looking at an object two or three feet away, so that there is a greater sensation of muscular strain; and this becomes our sign of the distance.

This monocular appreciation of distance is, however, greatly inferior to the binocular. By the use of the two eyes we have an additional system of distance-signs. Since in moving these (symmetrically) the two axes are always directed to the same point of the field, it follows that a movement to a nearer or to a further point involves a change in the relative position of the eyes. In the former case the two axes turn towards one another or become more convergent; in the latter they become less convergent. These changes in the degree of convergence are accompanied by different muscular sensations, and it is these sensations which serve as principal signs of the corresponding distances.[1]

[1] It is here supposed that we move the eyes from a nearer to a further point, or *vice versâ*. We may, however, get an idea of relative distances

The sensations of convergence, though giving us a much wider range of distance-discrimination than those of accommodation, cease to avail when objects are very remote. In these cases the perception of distance is determined by other elements, and takes on more of the character of a conscious *judgment*. These signs include such as the following: Recession of an object from the eye diminishes its "apparent magnitude"; it is further attended with the effects of "aerial perspective," such as diminution of the brightness of the object, and also of the differences between the bright and dark parts (which last, together with reduction of size, produces the *indistinctness* of distance), and lastly, those modifications of colour due to the action of the intervening medium.

The most important of the factors in this perception of distance is the 'apparent magnitude' of an object. This is determined by the 'extensive magnitude' of the retinal image or picture, or by the magnitude of the 'visual angle' subtended by this. As objects recede their retinal pictures decrease in area, whereas when they approach they increase. Whenever the object is a familiar one, a tree, a house, or a sheep, these variations of apparent magnitude are auxiliary signs of the distance of the object. Painters when they want to emphasise distance make use of this circumstance by introducing in the background a familiar form.

The development of the perception of distance in the infant has been observed in close connexion with that of direction. We see the child at first unable to adjust the movements of its eyes to objects at different distances, and for a still longer time unable to co-ordinate its arm-movements with its visual impressions. Children appear to attain to the distinction between what they can reach with their hand and what they cannot only after

without doing this. It was pointed out above that when our eyes are fixed on an object at a particular distance double images are received from objects lying considerably nearer or further off. These double images and the way they are disposed on the two retinas at once suggest a difference of distance, whether as nearness or as farness.

some months have passed. In the case of one otherwise intelligent child it was not perfect till about the end of the sixth month. And it was observed that another child tried to reach the lamp of a railway compartment when over a year old. As all observers of children know, it is some years before they become ready in distinguishing and recognising the signs of more remote distance.

Perception of Real Magnitude. The real magnitude of an object is directly known by means of active touch, arm-movement accompanied by contact, or, if the object is a large one, as a wall, by the aid of locomotion as well. All that the eye gives us directly is an apparent magnitude determined by the area of the retinal image. Since this varies inversely as the distance, it seems to follow that the eye's recognition of the real magnitude takes place in close connexion with that of distance. If the object is a familiar one we instantly recognise its real magnitude, whether or no we have a distinct perception of its distance. In this case the apparent magnitude may, as was shown above. become one factor in our estimation of distance. On the other hand, in the case of unfamiliar or unknown objects we only recognise (real) magnitude by aid of a rough perception, at least, of distance. Thus we only estimate the height of a cliff in a landscape by first judging of its distance from us. Children are wont to make absurd blunders about the size of more distant objects. The moon appears to everybody a small object, just because a direct appreciation of its enormous distance fails us.

While the perception of real magnitude thus implies, ultimately, a reference to active touch, it probably contains also, in many cases at least, a more immediate reference to a visual standard. In looking at an object, as a house, at a considerable distance, we seem first of all to recall the visual magnitude which it presents when near. We appear to transfer it imaginatively to a nearer point, namely, at that distance from us which is most favourable to the seeing of it at once, distinctly (in parts) and comprehensively (as a whole).

Perception of Relief and Solidity of Form. The visual perception of a solid body or one having relief is in part a

special case of recognising distance. A solid or cubical body is one the parts of which lie at unequal distances from us, some advancing, others receding. There is no original intuitive knowledge of solidity by means of the eye. This is abundantly shown by the fact that the infant requires some experience before it distinguishes solid objects from pictures and shadows. The idea of solidity or bulk is gained by means of active touch in the way indicated above.

The recognition of this solidity in the case of near objects takes place by discriminating the impressions received by way of the two eyes. A small flat object, as a drawing, when placed before the eyes at a distance say of two yards, and looked at by both eyes, projects *similar* pictures on the two retinas; that is to say, pictures made up of the same details, and with these details similarly arranged, since they fall on corresponding points. Not so, however, when the two eyes are fixed on a solid body at the same place. When, for example, the two eyes converge on the nearest point of the trunk of a tree lying at a distance of two yards, it is easy to see that the two retinas receive *two dissimilar pictures*. Thus, in the picture of the right retina, there will be imaged some points on the extreme right of the object which are absent in the picture of the left retina. Further, the details of the object, the lines of the bark, which are common to the two pictures, will not be similarly arranged, but will fall on non-corresponding points. Thus in the case of the right-eye picture the details of the right side of the trunk will image themselves on points lying further one from the other than in the case of the left-eye picture. Yet here we do not note the partial dissimilarity of the two impressions, nor do we see double images of the details not imaged on corresponding points. Under these circumstances, which innumerable experiences of active touch have told us answer to the presence of a solid body, we get a new optical effect, *viz.*, *the combination of the two dissimilar impressions in a perception of solidity or relief.*

Our knowledge of these signs of relief and solidity has been greatly furthered by Sir Ch. Wheatstone's discovery of the Stereoscope. This in-

strument presents to the eyes two distinct projections of an object, as a building, taken from two points of view lying at a short distance one from another, corresponding to the distance of one eye from the other, so that the two pictures differ one from another much as the two retinal pictures obtained from a solid object differ. Hence the powerful impression of solidity and relief produced by this instrument.

When an object is too far off for the dissimilar retinal effects to come into operation, relief or solidity has to be inferred from other signs. These include the distribution of light and shade on the surface, or what is known by artists as 'modelling'. Thus the prominence of a distant mountain is perceived by the gradations of light and shade. Reference may also be made to the effects of 'linear perspective,' or the apparent alteration in the direction of the lines of an object due to distance. Pictorial art makes use of these auxiliary signs of distance.

The perception of solid form illustrates in a striking manner the co-operation of a representative or ideational factor in the perceptual process. Thus in looking at the accompanying drawing of a cylindrical vessel (Fig. 8) I am able, by simply imagining that I am seeing it from above or from below, to make it *look* different, the upper half of each curve appearing further than the lower in the former case, nearer in the latter.[1]

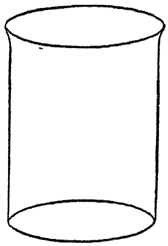

FIG. 8.

Perception of Objective Movement. As we have seen, ocular movement is the original experience which suggests to the eye the existence of definite localities or points in space. From this consciousness or perception of 'subjective' movement, that is to say, a movement of our own organism (eye or head), must be distinguished the perception of 'objective' movement, or a movement of objects.

The visual perception of movement, like the tactual one, arises in one of two ways. First of all we may follow a moving object with the eye and perceive its movement in direct vision.

[1] For other examples of the effect of imagination on the perception of relief, see my volume, *Illusions*, p. 77 ff.

In this case the objective movement is recognised by means of the muscular and other sensations accompanying it, coupled with a persistent and unaltered sensation received by way of the area of perfect vision. In the second place, we may perceive the movement of an object across the field by the help of indirect vision, the eye being at rest. In this case we recognise the fact of the object's movement through the circumstance that a persistent sensation is continually altered by change of local character (corresponding to the series of retinal points traversed by the image). This experience, moreover, differs from that of moving the eye over an object at rest in the absence of the connected muscular sensations which would tell us that we ourselves were moving.

Illusory movements occur when images of objects flit across the retina as the result of our own movement *and we overlook the fact of our moving.* Thus if I close the right eye and press with a finger on the outer surface of the left eye towards the nose, objects appear to move to the right. Similarly when travelling in a train and looking at stationary objects, as telegraph posts, they appear to fly past us because we momentarily forget our own swift motion.

In its developed form the perception of movement implies the intuition of space. It includes the recognition of a transition from one point of space to another, or of a continual change of position. It thus stands in a particularly close relation to the perception of direction, and like this has been developed in connexion with active touch.

Growth of Visual Perception. It follows from this short account of the nature of visual perception that, though an instantaneous automatic operation in mature life, it is the result of a slow process of acquisition involving innumerable experiences in early life. It is probable that in connexion with the inherited nervous organism every child has an innate disposition to co-ordinate retinal sensations with those of ocular movement, and visual sensations as a whole with experiences of active touch. But individual experience is necessary for the development of these instinctive tendencies.

A very little reflexion will show that the experiences of early life must tend to bring about the closest possible associations between sight and touch, and to favour that automatic interpretation of "visual language" which we find in later life. The child passes a great part of his waking life in handling objects, in walking towards and away from them, and concurrently looking at them and noting the changes of visual impression which accompany these movements. Thus in countless instances he notices the increase of the 'apparent magnitude' of a body when he moves towards it; the dissimilarity of the two visual impressions received from a solid body while he is handling it, and so forth. In this way an inseparable coalescence of signs and significates takes place at an epoch in life too far back for any of us to recall it.

When this stage of automatic visual perception is reached reference to touch in all cases is no longer necessary. Sight, having completely taken up and absorbed the touch-elements, is now independent. In the large majority of cases we recognise distance, real magnitude, and solidity, without any appeal to limb-movement and touch. Seeing has now become the habitual mode of perception. It is only in doubtful cases that we still go back to touch in order to test our visual perceptions.

While, however, visual perception has thus in a manner grown out of tactual perception, it far surpasses this last in respect of discriminative fineness as well as in comprehensive range. Seeing is more than a translation of touch-knowledge into a new language, and more than a shorthand abbreviation of it. It adds much to this knowledge by reason of its more perfect separation and combination of its sense-elements.

Theories of Visual Space-Consciousness. The above theory of visual perception follows the lines of the common English view of the subject since the classical work of Berkeley. It allows, indeed, the possibility of a purely visual development of space-intuition; but at the same time contends that this would not be *our* common space-perception, but that this last is a product of tactual experience grafted on visual.

At the same time the Berkeleyan theory of vision is only a hypothesis. It is still maintained by some that the eye is capable, without any assistance from touch, of supplying a complete perception in space in three dimensions.

According to these, space or volume is given originally along with, or as a property of, the retinal sensation, ocular movement serving merely to subdivide and measure this bigness. The question whether the eye is competent to the independent formation of a complete space-consciousness has been much discussed by German physiologists in connexion with the observation and explanation of optical phenomena. The facts do not as yet seem easily reconcilable with either of the extreme views. The same may be said of the facts much relied on by English Berkeleyans, *viz.*, the observations of the first visual impressions of children who were born blind and afterwards acquired sight. These, together with the observation of the development of visual perception in normal children, suggest that the visual apprehension of space, though dependent on touch for its clear development, is acquired more rapidly than the older Berkeleyan theory would suggest, and that it is aided by certain congenital arrangements.

Visual Intuition of Thing. In looking at an object, as in touching it, we apprehend simultaneously (or approximately so) a whole group of qualities. These include its degree of brightness as a whole, the distribution of light and shade of its parts, its colour (and local disposition of colours), the form and magnitude of its surface, and its solid shape. These seemingly immediate intuitions involve, as we have found, tactual as well as visual elements. A further tangible quality always more or less distinctly present in this first apprehension of thing is materiality as made known to active touch. To see *an object* is to recognise the presence of that which would resist. This complex of visual and tactual elements may be called the primary stage in our visual intuition of an object. In looking at something new, as a gem in a cabinet, we instantly intuit or take in this group of purely visible, visible and tangible, and purely tangible, qualities, and they constitute a considerable amount of knowledge concerning the nature of the object as a whole.

The *recognition* of any object, as a particular horse, or of one of a class of things, as oranges, presupposes a *repetition* of this assemblage of qualities. In this case the group is not only discriminated but assimilated or classed. Thus, on seeing an orange, a child at once 'classes' the aggregate of qualities (yellow colour and roundness of form) with like groups previously seen.

Moreover, in thus classing a particular group of qualities directly presented to the eye,[1] a child will take up and recognise the presence of a number of other special groups of associated qualities Thus in recognising an object, as an orange, he invests it more or less distinctly with a particular degree of hardness, weight, etc. Nay, more, he mentally endows it with a particular temperature, taste, and even smell. In this way visual perception (embodying important tactual elements) suffices for the full apprehension of a definite concrete object clothed with its complete outfit of qualities.

Identifying Objects. The visual recognition of a thing as identical with something previously perceived takes place by help of the idea of persistence already dealt with. Since things vary greatly at different times in their appearance to the eye, it follows that visual recognition involves the germ of a higher intellectual process, namely, the comparison of successive impressions and the detection of similarity amid diversity or change. Thus a child learns to recognise his hat, or his dog, at different distances and under different lights (in bright sunlight, evening dusk, etc.), by discounting a certain amount of dissimilarity. Of these changes of aspect one of the most important is that due to the position of the object in relation to the spectator. The difference of impression in looking at a hat 'end on' or foreshortened and from the side, or in having a front and side view of a face, is considerable. Children require a certain amount of experience and practice before they recognise an object amid such varying aspects.

It is to be observed that the identification of objects is greatly aided by the social environment and by language. A child learns to perceive and recognise objects in association with others. From the first the mother or nurse is pointing out objects to him; describing their characteristics, and naming them. By these interchanges of impressions and this social guidance he learns that others see things as he sees them, that external things are *common* objects of perception. And by hearing them again and

[1] That is to say relatively so, for, as we saw, even the visual perception of roundness probably embodies a representative element.

again called by the same name he learns more quickly to regard them as the same.

Knowledge of Bodily Organism. It was pointed out above that the tactual perception of external objects goes on in close connexion with that of the bodily organism. It is only as the child learns to localise its dermal sensations in this and that part of the trunk, or of the limb, that a complete tactual apprehension of extended surface becomes possible. We have now to look at this process of localisation as an element, and a principal element, in the knowledge of the body.

There is no reason to suppose that the child's first bodily sensations are definitely localised. Whatever the vague 'local' differences that mark off the sensations arising in different regions of the body and connected with the distinctness of the nerve-fibres, these would convey no knowledge of locality at first. A baby pricked in a particular area of the trunk is unable to reach the spot with its hand. Localisation comes gradually by help of the exploring movements already discussed The fact that the child's own body is always present to its moving tactile organ would in itself favour the acquisition of knowledge of its surface. But there is a more important reason. When the child touches and holds his foot he *produces*, or to speak more correctly, *alters sensation in that part*. Thus, by taking a cold foot in his hand he warms it. By bringing his hand too suddenly to his head he hurts it. Such experiences would lead, according to the above principle of associative integration, to the reference of all sensations of a particular original local colouring to a definite region of the bodily surface. In other words, bodily sensations would be projected to the points corresponding to the peripheral extremities of the corresponding nerve-fibre, and the child would say he has a sensation in the toe, the head, etc.

This purely tactual localisation would be supplemented by a visual localisation. A child can see a good portion of the surface of its body, and the direct visual perception is later on eked out by the help of mirrors. In this way the body comes as an object within the changing field of vision, and a visual map of its surface

is developed in addition to, and in close connexion with, the tactual map. Thus, when the hand is moved to the toe the movement is followed by the eye, and in this way the toe is localised in corresponding regions of the tactual and the visual space-scheme Sight would further assist in the development of this localisation of bodily sensation by showing the locality of a foreign body that was acting agreeably or disagreeably on the skin.

The imperfect localisation of internal bodily sensations, as those of the viscera, depends on the same principle. These parts are of course excluded from sight, and are not directly accessible to touch. But by pressures on the surface of the body we are able indirectly to act upon and modify the sensations. In this way children come in time to refer pains to more or less definitely apprehended regions of the organism.[1] This knowledge is later on supplemented, in the case of educated persons, by a scientific study of the bodily organs and their local arrangements.

To a child his own body, though tactually and visually explored like other objects, is marked off from these by the fact that it is connected in a peculiar way with his conscious life, and more particularly his feelings of pleasure and pain. The experience of touching the foot with the hand differs from that of touching a foreign body by the all-important adjunct to the sensation in the touching hand, *of a sensation in the touched foot.* Pressures of this kind on the organism soon come to be recognised as the causes of pleasurable and painful sensations The earliest pleasures and pains are largely made up of such bodily feelings. And these, whether due to external agencies (as a blow or caress), or to internal changes (*e.g.*, in the circulation or temperature), are always referred more or less definitely to certain parts of the organism. Hence we all regard the body as a portion of ourself, and in early life probably it makes up the chief part of the meaning of the word 'self'. A

[1] A medical friend tells me it is not uncommon to find children of three and four who, when the seat of their pain is sought by the question 'Does it hurt you here?' the doctor's hand being laid on the abdomen, the head, etc., are quite unable to answer the question.

more abstract idea of self, as mind or subject in its antithesis to material objects, is, as we shall see, a much later attainment. It follows that in the earlier perception there is no distinct apprehension of the 'not me' in its opposition to the 'me'.[1]

(c) Auditory Perception.

Space-Perception : (*a*) Genesis of Aural Space-Consciousness. As has been observed above, the ear falls far below the hand and the eye as an organ of space-perception. Its want of a mosaic-like sensitive surface and of a muscular apparatus, such as exist in the case of the two other organs, prevents the development of a space-consciousness comparable to theirs in directness, completeness, and fineness of discrimination. Nevertheless, this sense is not wholly without an apparatus capable of developing space-distinctions.

We distinguish sounds as to their direction, relatively to one another and to ourselves, and also as to their distance from us. With respect to direction, common experience tells us that we distinguish a sound to the left from one to the right better than a sound immediately in front of us from one behind us. In many cases it is mainly, if not exclusively, the difference in the intensity of the impressions received by the two ears which determines the sense or judgment of direction. This seems to be shown by the fact that when one ear is stopped not only does a sound in front appear to shift towards the direction of the other ear, but that the discrimination of direction for sounds opposite the open ear falls off materially. This suggests that hearing is binaural just as seeing is binocular.

At the same time, recent experiment has led to the supposi-

[1] This truth is rightly apprehended by the Poet Laureate in the lines :—

> "The baby new to earth and sky,
> What time his tender palm is prest
> Against the circle of the breast,
> Has never thought that 'this is I'."
>
> —*In Memoriam* (*XLIV.*).

tion that each ear can discriminate direction independently. The exact limits of this discrimination are as yet not assignable. Nor is it possible to say by what apparatus such discrimination of direction is carried out. It has been suggested that the nerve-filaments terminating in the semicircular canals, which lie in planes at right angles one to another, are the special mechanism engaged. It is pretty certain that the shell or outer ear also co-operates. And, lastly, it is to be added that although the human ear is immobile, rotatory movements of the head, especially those which bring the face opposite the direction of the sound, are probably a factor in the development of the aural space-consciousness.

There is reason, moreover, to suppose that the ear furnishes modifications of sensation by which differences of distance in the sounding body are apprehended. In the varying intensity of sound with varying distance, we have, it is evident, an analogue of the differences of apparent magnitude and brightness in visible objects under like circumstances. It is inferrible also that, owing to the dropping out of the weaker partial tones as distance increases, sounds alter in timbre as they recede from the ear.

(*b*) **Co-ordination of Aural and Extra-aural Factors.** While the sense of hearing thus probably develops a certain space-perception of its own, this is at best vague and fragmentary. The ear's sense of direction in relation to the hearer involves, like that of the eye, a reference to arm-movement and touch. We are all aware, indeed, in carrying out such imperfect localisations of sound as we are able, that we project them into a space which we have come to know by touch and sight.

This is further shown in the fact that the ear by itself would develop no *direct* perception of distance. Whatever the data supplied by aural sensations for estimating distance, it seems certain that in our ordinary judgments there is always a process of inference from past experience. Thus, we learn that sounds diminish in intensity as their source recedes, and hence we come to associate low intensity with distance. This is seen in the fact that by closing the ears with the fingers we seem to send sounds

further away. In the case of familiar sounds, as the ticking of a clock, we can, after a certain amount of experience, very roughly estimate its distance by this means.

Auditory Perception of Time. While hearing thus gives us comparatively little knowledge of space, it yields a very exact perception of time-relations. By this is meant the approximately direct apprehension of the order of succession, and of the rapidity of succession, and duration of sounds. Thus we perceive the sequence of, and estimate the interval between, two clicks of a clock, and the duration of a musical tone.

Since the impressions whose time-relations are thus apprehended actually succeed one another in time, our perception of succession would seem to involve a certain persistence and so an overlapping of the sequent impressions, so that they may co-exist and be related to one another in one unifying act of perception. Our so-called *perception* of time, as we shall see by-and-by, always involves at least a rudimentary process of retrospection and representation of impressions which are already past.

Recent experiments have shown that the grasp of a successive series of sounds in a time-perception has its limits. Thus, in order to be connected, two successive sounds must be separated by an interval which must not be less than $\frac{1}{500}$ of a second or greater that 4 seconds. It is further found that, provided the interval is a favourable one (about $\frac{1}{4}$ of a second), a series of eight or more sounds can be grouped as one series.

A further point, elucidated by experimental inquiry, is how far we can measure the precise interval between two sounds, and how this power varies as the interval is lengthened or shortened. It seems to be ascertained that the measurement is most exact when the interval is from a half to a whole second.

The nice appreciation of time-relations in the case of the ear is of great practical consequence. Thus it is evident that the rapid and easy apprehension of spoken language depends on an accurate perception of the order of succession of the sounds, and a ready combination of the members of a time-series in a single perception.

It is, however, in the perception of the rhythmic successions of verse and music that the ear's appreciation of time-relations shows itself at its best. The essential element in this experience is regular recurrence after a definite interval, or *periodicity*. Here an accurate measurement of time-interval becomes essential. What we mean by the appreciation of time in music includes the comparison of successive simple time-lengths, whether filled with sound, or empty intervals or pauses, as well as multiples of these. Thus in 'common time' the ear recognises the equality of duration or time-interval of the units (the crotchets), and of the quadruple groups of these making up the bars. The full appreciation of rhythm in music, and measure in verse, implies, in addition to measurement of time-length or interval, a recognition of numerical relations. The ear notes the periodic recurrence of a particular number of sounds in the case of each musical bar, as of the three in triple time, and this recognition underlies the appreciation of the particular form of the movement.

Musical Perception. Besides the perception of time-relations under the form of rhythm, music involves the discernment of other and specifically musical relations. These include the distances of tones one from another in the scale, or pitch-interval. To the musical ear each note in the scale has its definite position, and presents itself as standing at a certain distance from other notes, more particularly the ground- or key-note. In other words, tones are projected on a represented background answering to the total scale of sounds, or, more exactly, to the series of tones constituting the particular key.

In addition to these relations of pitch, the musical ear perceives relations of tonal affinity, such as that between a note and the octave above it. These tonal relationships enter into what we call melody or melodious succession of tones. Melodic relationship probably depends, like the harmonious combination of simultaneous tones, on the presence of common elements, *viz.*, upper partial tones.

Development of Perceptual Process. Our analysis of

perception has suggested the way in which our percepts are gradually built up and perfected. A word or two on the general course of this perceptual development may suffice.

In the first weeks of life there is little if any recognition by the eye of outer things. Impressions are made on the child's mind, but at best the reference to an external world is of the vaguest. About the fifth month, however, the child may be observed watching his moving hands. Soon after, the first attempts to grasp objects are noticed, these attaining accuracy by degrees.[1] The perception of the distance of more remote objects remains very imperfect before locomotion is attained. Thus a child more than a year old was seen to try to grasp at the lamp in the ceiling of a railway compartment. This shows that change of visible scene as the child is carried about the room, though it no doubt impresses him, is not sufficient for acquiring a clear cognition of distance. It is some years before he begins to note the signs of distance in the case of objects a mile or more away.

After many conjunctions of impressions the child begins to find out the nature of objects and the visible aspects which are their most important marks. That is to say, he begins to discriminate objects one from another by means of sight alone, and to recognise them as they reappear to the eye. Sight now grows self-sufficient. What may be roughly marked off as the *touching* age gives place to the *seeing* age. Henceforth the growth of perception is mainly an improvement of visual capability.

At first this power of discerning forms with the eye is limited to objects of great practical or æsthetic interest, as the child's bottle, the rattle. The observer notes one or two prominent and striking features of a thing but overlooks the others. Thus in

[1] A child known to the present writer was first seen to stretch out his hand to an object when two and a half months old. The hand misses the exact point at first, passing beside it, but practice gives precision to the movement. The same child at six months knew when an object was within reach. If a biscuit or other object was held out of his reach, he made no movement, but as soon as it was brought within his reach he instantly put out his hand to take it.

looking at real animals, or at his toy or picture imitations, he will distinguish a quadruped from a bird, but not one quadruped from another and similar one, as the goat and the sheep.

The progress of perception grows with that of analytic attention, and of visual discrimination and the correlative process of assimilation. As a result of this the child finds it easier to note selectively the characteristic aspects of things and to recognise them by these marks. In this way his observations tend gradually to improve in distinctness and in accuracy. Not only so, an increased power of synthetic attention enables him to seize and embrace in a single view a larger number of details. In this way fuller and more exact percepts are substituted for the early 'sketchy' ones. Thus a particular flower, or animal, is seen more completely in all its detailed features of colour and form. Also a wider area of presentation becomes attended to, and in this way larger and more complex objects, such as a room, a whole building, come to be perceived as single wholes.

The observing powers may develop in different directions according to special natural capabilities, or special circumstances. Thus it is well known that a particularly good colour-sense, accompanied by a correspondingly lively interest in colours, will lead to a more careful observation of this aspect of things A naturalist or an artist has a keen eye for details of form which escape the common eye. The child Ruskin could be happy for hours watching the rich varying play of light colour and movement in a stream. In like manner it is well known that the blind who are thrown on tactual perception, as their main source of knowledge, attain a remarkable fineness and quickness of perception. The blind deaf mute, Laura Bridgman, could estimate the age of a stranger by feeling the wrinkles about the eyes.[1] Sense-presentations may thus be said to acquire a different content for us according to the habitual direction of our observing powers.

The Regulation of Perception : The Art of Observa-

[1] For an account of Laura Bridgman, see *Mind*, vol iv. p. 149 ff.

tion. All perception involves a measure of that reactive process which we call attention. But we are often able to discriminate and recognise an object or an action by a momentary glance which suffices to take in a few prominent marks. Such incomplete fugitive perception is ample for rough every-day purposes. On the other hand, we sometimes need to throw a special degree of energy into the process of perception so as to note completely and accurately what is present. This is particularly the case with new and unfamiliar objects. Such a careful direction of the mind to objects is known as Observation. This observation may be carried out by way of any one of the senses, as when a lady tactually examines the texture of a fabric. The term commonly refers, however, to a careful *visual* scrutiny of objects.

Observation in its highest form is a methodical process. It implies a deliberate selection of an object for special consideration, a preparatory adjustment of the attention, and an orderly going to work with a view to see what exactly takes place in the world about us. This methodical procedure is specially conspicuous in scientific observation, as that of the astronomer, or the chemist. Such observation commonly involves, further, a prolonged and patient attention to changes in an object, *i.e.*, to a process. Observation may thus be said to be regulated perception.

Good observation consists in careful and minute attention to what is before us. Thus, in order to observe nicely a particular flower or mineral, we must note all the individual characteristics, the less conspicuous as well as the more prominent. Similarly, if we wish to observe a process such as evaporation, or the movements of expression in a person's face, we must carefully seize all the stages of the operation. By such a close effort of attention we give distinctness to our observations and accurately mark off what we are observing from other and similar objects with which they are liable to be confused.[1]

[1] We might call a percept *distinct* when we see an object apart from other and surrounding objects, and *clear* when we mentally grasp all its parts or details. Perfect or accurate perception would of course include both pistinctness and clearness.

It may be added that good observation includes a certain self-restraint, a resolute limitation of attention to what is actually presented, and an exclusion of all irrelevant imaginative activity. Thus it includes in the carefully-trained mind the inhibition of the impulse to go beyond the observed facts in what is called inference, a common fault of bad observers, as the witness-box in our law-courts illustrates. Also it involves the restraining of the impulse to look out for a particular thing when this grows into prepossession. The undisciplined mind is apt to see what it expects, wishes, or it may be fears to see. Even scientific observation has been vitiated by a strong prepossession or expectation of a particular appearance. In like manner the undisciplined mind tends, like the Professor in the *Water Babies*, to overlook that which it is disinclined to believe in. Methodical observation must, no doubt, as the history of physical science tells us, be stimulated and guided by anticipation or imaginative conjecture. We should, in many cases, not see things at all if we were not on the look-out for them. At the same time, good observation never allows itself to be overshadowed or interfered with by such imaginative activity.

It is less easy to draw up definite rules for the regulation of the perceptual process in observation than for that of the reasoning process. Good observation comes from a trained habit, and is the resultant of a combination of forces, such as a strong interest in objects, a disciplined command of the attention by the will, and zealous regard for fact or reality. If we want to observe well we must try to develop a strong interest in external things, and carry out a careful practice of methodical observation for a definite purpose, *e.g.*, pictorial representation, verbal description, or scientific discovery. We must, further, be on our guard against the snares of *mal*-observation.[1] In like manner, the educator who aims at developing a child's observation and

[1] On the errors incident to observation, and its logical control, see J. S. Mill, *Logic*, bk. iv. chap. i.

perfecting him in the use of the senses, attains this object not so much by laying down any definite rules as by rousing interest in objects, by systematically exercising the learner in observation, and so producing a habit of accuracy.

Psychology and Philosophy of Perception. In the foregoing account of the development of perception, we have been concerned only with its *subjective* side, that is to say, the nature of the psychical process by which percepts are formed. We have been answering the question: By what steps, by aid of what discoverable psychical facts, does a child reach what we call a knowledge of things in space and time?

After this problem has been answered there remains another question, or group of questions, related to, yet to be carefully distinguished from it, dealing with the *objective* side of perception, that is to say, with its validity as cognition when we have it. Looking at perception on this side we ask What is the value of perception as an (apparently) immediate knowledge of something external to, and independent of, the knowing mind? What is meant by the externality of a thing? Is space, for example, something really existent apart from our percipient minds, or, as Kant held, something subjective, a form of apprehension supplied by the mind itself? Again, is material reality, or that which marks off an actual thing from an illusion, something absolutely apart from our perception, or is it merely one phase of our sense-experience itself? Thus, is a stone nothing more than a sum of sensations of touch, etc., actually experienced at the time, or represented as uniformly occurring under certain circumstances, or does our knowledge of it as a material object in space imply more than the sum of all the sensations by the aid of which we come to know it? If the latter (as perhaps most persons would say), how is such knowledge guaranteed or made certain? These problems belong to the Philosophy, as distinguished from the Psychology, of Perception. They are variously known as the problem of Presentative Knowledge of External Perception, or of the External World. The Realist asserts that space and material object exist *per se* whether brought into relation to percipient mind or not. The Idealist, on the contrary, maintains that what we mean by external reality, by material thing, is resolvable into certain aspects and relations of our conscious experience itself. The solution of this problem, though it may derive help from the psychology of the subject, can only be carried out by a properly philosophical examination of the essential nature and conditions of Knowledge.[1]

[1] The student who cares to go into the philosophic side of perception cannot do better than consult Prof. Fraser, *Selections from Berkeley*.

REFERENCES FOR READING.

For a fuller account of the way in which we learn to localise impressions and perceive objects the reader is referred to Prof. Bain's treatise, *Senses and Intellect*, under 'Sense of Touch,' § 13, etc.; under 'Sense of Sight,' § 12, etc.; and later, under 'Intellect,' § 33, etc.; also to the excellent analysis of perception in Mr. H. Spencer's *Principles of Psychology*, vol. ii. pt. vi. chaps. ix. to xviii. With these may be compared M. Taine's interesting chapter on 'External Perception and the Education of the Senses,' *On Intelligence*, pt. ii. bk. ii. chap. ii. Among more recent works in English are to be noticed Ward's article, "Psychology" (*Encyclop. Britann.*), p. 51 ff.; and W. James's *Psychology*, chaps. xx. and xxi.

CHAPTER VIII.

REPRODUCTIVE IMAGINATION: MEMORY.

Transition from Presentation to Representation: The Temporary Image. The percept is the immediate outcome of the organisation of certain portions of our sense-experience. It is, moreover, as we have seen, though taking up into itself a representative element, coloured throughout by its more vivid sensuous ingredient. Hence we mark it off from the higher region of ideation as a presentation or direct sense-presentment.

Presentations or percepts, though the foundation of all our thought respecting things, are in themselves fugitive psychical phenomena. A percept, depending as it does (in normal circumstances) on a peripheral stimulus, ceases when that stimulus is withdrawn. In order, then, to that permanent psychical product which we call cognition something more than perception is necessary. This additional factor is supplied by that consequent or after-effect of the percept which we popularly call an idea, but which is more accurately described as a mental image, or representative image.

It was pointed out above that sensations have a temporary persistence. Since in the mature consciousness all sensations instantly develop into percepts, we may express this fact of temporary retention as follows: *All percepts, whether visual, auditory, or other, tend to persist beyond the moment of the cessation of the sensory stimulus.* Thus the perception of a bright object, as the setting sun, is often followed for some seconds by that which is known as an 'after-image,' but which may be just as appropriately described as an 'after-percept,' of

the object. This temporary persistence is, as we saw, involved in the perception of a series of sounds.

In addition to these after-images, which are only occasional and fugitive, a vivid and distinct impression, involving a special effort of attention, is apt to beget a mental image properly so called, which may persist for some time after the percept. Thus after intent visual inspection, as in microscopic investigation, the image of the object hovers about, so to speak, for some time, recurring again and again, as soon as other objects of attention are removed. This temporary image is important as forming the first stage of the true memory-image.

The Revival of Percepts. This temporary 'echo' of impressions or percepts, though it enables us to prolong, in a manner, the inspection of our percepts, has only a limited value in relation to the permanent acquisition of knowledge. When we talk of picturing, imagining, or mentally representing an object, we imply the appearance of the image *after an interval.* This resurgence of the image after the complete subsidence of the percept is popularly described as a revival or reproduction of the original impression, that is, percept. This language, however, is figurative and apt to mislead. It does not imply that an image is, strictly speaking, 'the same' as the percept (in the sense in which a thing is one and the same when seen at different times); nor does it mean that the image is perfectly similar as a mode of consciousness or a psychosis to a percept.

It is to be noted that this revival under the new form of an image holds good of all classes of percepts or "sense-impressions". Thus, in psychology, we speak of an image of a sound and of a taste, just as we speak of an image of a colour. Images derived from visual percepts are, no doubt, as we shall see, the larger and more important portion of our image-store, but we must keep steadily in view that other sense-experiences as well give rise to images.

This revival of percepts after the lapse of time is, as pointed out above, the most striking manifestation of the effect of peripheral stimulation in permanently modifying the nerve-centres by

setting up "physiological dispositions". When Milton went on picturing objects with singular vividness and distinctness after the loss of sight, and Beethoven continued to marshal tone-imagery with perfect ease after he had lost his hearing, they gave signal proof of the fact that *the brain, though requiring peripheral stimulation for its initial activity, grows in time to be independent of such stimulation.*

Process of Revival. It has already been pointed out, that, speaking psychologically, we only know retention through the fact of revival. If, as is supposed by some, a percept has some sort of existence during the interval preceding revival out of consciousness, we can have no direct knowledge of the fact; all that experience tells is that the percept is under certain conditions subsequently re-excited, or reproduced, under the new and altered form of an image.

The immediate conditions of the appearance of the image are, as pointed out, the recurrence in restricted form of that mode of central excitation which conditioned the original impression. The process of revival doubtless includes a stage, or rather a series of stages, of imperfect, that is, sub-conscious ideation. Thus, in imagining a rose, I can trace a process of gradual emergence or coming into the clear light of consciousness. This succession of a distinct on an indistinct stage does not, however, any more than the reverse process, the sinking or fading of the original percept, prove that the image existed before the process of revival began.

Differentiæ of Images and Percepts. The fact that we have no difficulty in general in distinguishing between the percept and the image, *e.g.*, the sight of a horse and the mental representation of it, suggests that there must be certain differences between them. The most obvious point of difference is the greater intensity of the sensational or presentative element in the percept, which gives to the whole structure its peculiar vividness (or strength). Along with this superior intensity, and perhaps more important than this, is the greater distinctness of percepts, in general, as compared with images.

These differences, though important, are not all: otherwise we should confuse weak and indistinct impressions, *e.g.*, those of faint sounds, or of indistinctly-seen objects, with images. One other distinguishing character of images is their instability, changeableness, as contrasted with the steadiness of percepts: a percept commands the attention by its insistence, whereas the image only grows distinct when transfixed by attention. Again, the image is wanting in those more definite muscular sensations which tell us that we are using the peripheral organ, *e g.*, the eye.[1] Other marks of difference present themselves when a closer examination is needed. Thus there is the obvious distinction that images are not affected by movement, as percepts are, which appear and disappear as the eye moves towards or away from a particular point. These psychical differences seem to be connected with the known differences of the neural process, *viz.*, the restriction of the nervous current to the centres, and the absence of a full motor reaction.

It may be added that such a distinction as we find drawn by normal persons when in health between the percept and the image obviously has a biological significance. If we were given to taking our images for percepts, so as to react upon them as such, we should plainly fail in biological adjustment. This failure shows itself in those distinctly abnormal states where the image reaches the stage of a hallucination, and the subject directs his actions to imaginary as distinguished from real objects in his surroundings.

Coalescence of Image and Percept: Recognition of Objects. Just as in mature life we never have a sensation without some of that complicative process by which percepts are formed, so all our percepts embody a merged form of the image. It is evident, indeed, that, in recognising an object seen before, the assimilation of the present percept to a former one involves the coalescence

[1] How far this difference assists in the discrimination is doubtful. As we saw above (p. 83), there is a certain amount of the muscular element in ideational attention. It seems, however, to be much less definite in this case.

with this percept of the revived image of its predecessor. And since we never see wholly new objects, but assimilate even the so-called new ones in respect of their position in space, size, colour, and so forth, to objects previously known, it follows that there are image-rudiments in all our percepts.

Such a nascent rudiment of an image must, however, be distinguished from an image proper. The process of assimilating a percept, and of calling up the image of an object now absent, are markedly different, and represent two stages of the reproductive process. We are often able to identify an object, as a face, when we actually see it, without having any corresponding power of imaging it when it is absent. The lower animals, which have at best only a rudimentary power of imaging, often display a marvellous power of recognising. The memory of the dog, as illustrated in the famous story of the recognition of Ulysses after years of travel, is proverbial.[1]

Reaction of Image on Percept. In recognition the percept and the image are fused, the presence of the latter being indicated merely in the peculiar appearance of familiarity which the percept assumes. In many cases, however, the coalescence is preceded by a partial or complete severance of the two factors. In these instances the percept is modified by an image which distinctly appears as such. This effect is known as the reaction of the image on the percept.

The most common illustration of this action is that in which there is an ideational or imaginative preparation for the percept, or a stage of "pre-perception," as when after expecting the arrival of a person the process of recognition is appreciably shortened (*cf.* above, p. 86).[2] It appears in a less distinct form, where, previously to the occurrence of the sensation, there

[1] Darwin purposely tried the memory of his dog, an animal averse to all strangers, and found that after a separation of more than five years he instantly obeyed his call as of old. (*The Descent of Man*, 2nd ed., p. 74.)

[2] It is proved that it takes about twice as long to read out a series of disconnected words as the same amount of connected discourse, the latter process being aided by continual anticipation of the coming ideas and words.

has taken place a central excitation leading to a nascent or subconscious idea. Thus, if I visit a particular town, the idea of an acquaintance who happens to live there will be partially reinstated, so that, should he actually present himself, the recognition will be expedited.

It may be added that the action of imagination on our sense-experience is beneficial only so long as a certain balance between the two is maintained. Normal mental activity is that which adjusts itself to real circumstances, and so must start from, and be based upon, sense-presentations. Hence the healthy influence of the image on the percept is restricted to the effect of furthering or expediting the percept which would otherwise arise. If, however, the imaginative factor grows so masterful as to modify the distinctive characters of the sensation-complex, we have a tendency to illusion. This is the state of things in all conditions of unreasonable intensity of expectation, as when a frightened child takes a harmless object for a hobgoblin.

Distinctness of Images. The chief merit or excellence of a representative image consists in its distinctness or clearness. By this is commonly meant that the image be definite and not vague, that the several parts or features of the object be distinctly pictured in their relations one to another. Thus we have a distinct image of a person's face when we call up its several features, as the outline or contour of the whole, the shape of the mouth, and the colour of the eyes. On the other hand, the image is spoken of as indistinct, obscure, or vague when the details of the object are only imperfectly pictured.

Closely connected with the distinctness of images as just defined is their distinctness in relation to other images. The expression "a distinct mental picture" seems, indeed, to have as one of its meanings perfect differentiation, or discriminative detachment from other images. Thus we are said to represent a face "distinctly" when we definitely apprehend its individual peculiarities.

The terms clearness and distinctness seem to be employed almost interchangeably for each of the above aspects of images. If it were possible to break through a habit of speech, it might be advantageous, modify-

ing the phraseology of Leibniz, to use the antithesis clear—obscure with reference to the first kind of distinctness (distinctness of parts or details), and the antithesis distinct—confused with reference to the second kind (distinctness of the whole). The close connexion between the terms distinct and clear will be illustrated again by-and-by, in connexion with general ideas or concepts.

It is customary to distinguish between the liveliness or vividness of an image and its distinctness. For purposes of knowledge the latter is more important than the former. Images are in general wanting in the intensity of the corresponding percepts. I do not visualise all the brightness of the sun, or all the depth of colouring of a sunset when I imagine it. There may be a fair degree of distinctness with a comparatively low degree of vividness, and this seems to be the condition most favourable to clear thinking.

Our mental imagery shows all degrees of distinctness. Many of our representations are vague, blurred, and indistinct, and as a consequence tend to be confused one with another. The statistical investigations of Mr. F. Galton into the nature of visual representation, or what he calls 'visualisation,' go to show that this power varies greatly among individuals (of the same race), that many persons have very little ability to call up distinct mental pictures of such familiar objects as the breakfast-table.

From this distinctness of an image it is important to distinguish its accuracy. By this is meant its fidelity as a copy, or its perfect correspondence with the original, the percept. Want of distinctness commonly leads to inaccuracy, if in no other respect, in that of deficiency. But what we ordinarily mean by an inaccurate image is something more than a merely defective one. It implies the importation of some foreign element into the structure of the image. Thus we have an inaccurate image of a face when we ascribe a wrong colour to the eyes or a wrong height to the brow. It is probable that all images tend to become inaccurate, by way not only of loss, but of confusion, of elements, with the lapse of time.

General Conditions of the Retention and Reproduction of Percepts. The capability of representing an object or event some time after it has been perceived is not absolute, but is limited by certain conditions. These may be roughly summed

up under the two following heads. In the first place, the original impression must, in order to be subsequently revived, attain a certain degree of perfection in respect of vividness and clearness. We will call this condition the depth of the impression. In the second place, there is needed in ordinary cases the presence of something to remind us of the object or to suggest it to our minds. This second circumstance is known as the force of suggestion.

(*a*) **Depth of Impression: (1) Intensity, etc., of Sensation.** In the first place, then, we may say that a distinct image presupposes a certain force and distinctness of the original impression. A moderately loud sound will in general be recalled better than a faint one, just because, as a sensation of greater intensity, it is stronger and more impressive, and makes a more successful appeal to the attention. For a similar reason, clearness and distinctness of impression are favourable to retention. A face distinctly seen with all its details is much more likely to be recalled than one indistinctly seen. For these reasons, actual impressions are in general much better recalled than products of imagination: for, as a rule, they surpass the latter in vividness and distinctness. We recall the appearance of a place we have seen better than one that has only been described to us. The habit of repeating words audibly when we want to remember them is based on this principle. As a last determining factor of a forcible impression may be named duration. Every fully-developed sensation requires an appreciable time. A momentary sound remains indistinct as to its quality, its direction, and so forth. Accordingly prolonged sensations are as such of greater impressive force than momentary ones.

(2) **Attention as Condition of Retention.** So far we have regarded an impression as conditioned by external circumstances. But, as we have seen, the intensity, distinctness, and the duration of a sensation are partly determined by an internal condition, *viz.*, the amount of reaction in the way of attention called forth. Hence we have to add that the depth, and consequently the revivability, of an impression depend on the degree

of interest excited by the object and the corresponding vigour of the act of attention. Where, for example, a boy is deeply interested in a spectacle, as a cricket match, he retains a distinct image of what has been seen. Such interest and direction of attention ensure a clear discrimination of the object, both in its several parts or details, and as a whole. And, as we have seen, the fineness of the discriminative process in perception is one main factor in the determination of the subsequent retention.

The nature and sources of interest have been sufficiently discussed above. The essential element in interest is feeling, and any marked accompaniment of feeling, whether pleasurable or painful, is, as we all know, a great aid to retention. Thus the events of our early childhood which we permanently retain commonly show an accompaniment of strong feeling, more particularly, perhaps, that of childish wonder at something new and marvellous, whether delightful or terrible. The effect of disagreeable feeling in fixing impressions is illustrated in the retention of the image of an ugly or malevolent-looking face, of words in a foreign language which have disagreeable associations, as *bougie*, *douanier*, to the English traveller. Where such a powerful intrinsic interest is wanting, a vigorous exercise of *voluntary* attention may bring about a permanent retention. But, as pointed out above, such voluntary attention is only effective because it involves a feeling of interest. When we try to retain for social reasons a person's name, we are feeling at the moment a social interest in that name.

It is to be observed, finally, that even when the conditions just specified are equally favourable to retention the result may vary, owing to temporary variations of our psycho-physical state. The acquisition of a new impression involves a nervous formation, and this again depends on nutritive processes. Hence we are much more ready to note and to retain what presents itself to our senses when our sense-organs and nerve-centres are refreshed by rest and vigorous. It is commonly agreed that children take on new acquisitions better in the earlier part of the day when their psycho-physical organism is recuperated by sleep. Differences in

emotional condition, again, which appear to involve variations in the energy and rapidity of brain-action, render us much more impressionable at some moments than at others. As more than one novelist have illustrated, moments of intense feeling appear to raise the plastic or acquisitive powers of the brain to a preternatural height, so that small insignificant details of the objects happening to present themselves at the moment are permanently reflected in the mirror of the mind.

(3) **Repetition as Condition of Retention.** We have thus far supposed that the object or event represented has been perceived but once only. But a single impression rarely suffices for a lasting representation. As we have seen, images tend to grow faint and indistinct; hence they need to be re-invigorated by new impressions. Most of the experiences of life, including some of great and absorbing interest at the time of their occurrence, are forgotten just because they never recur in a sufficiently like form. The bulk of our mental imagery answers to objects which we see again and again, and events which occur repeatedly. Here then we have a second circumstance which helps to determine the depth of an impression. Every new repetition of an impression, provided the interval since the last is not long enough to produce effacement, tends to render the image more distinct and more stable. Where the repetition of the actual impression is impossible, the reproduction of it will serve, to some extent, to bring about a like result. We may fix verses and so forth in the memory by going over them mentally or inaudibly. In like manner, we keep the images of remote experiences from disappearing by periodically reviving them, as when children talk with their parents about common experiences of the past. The points of similarity and dissimilarity between the physiological process in the case of the percept and of the image help us to understand how this renewal of the image serves as an inferior substitute for the repetition of the original presentation.

These two conditions, a certain amount of attention, and a certain frequency of repetition, may take the place of one another to some extent. Thus the more interesting an impression the

smaller the number of repetitions necessary, as is illustrated in the words of the already-enamoured Juliet:—

> My ears have not yet drunk a hundred words
> Of that tongue's utterance, yet I know the sound.

On the other hand, repeated impressions, even when not very interesting, as, for example, those of ubiquitous advertisements, manage by their importunity to stamp themselves on the memory.

At the same time, it may be said that, in all cases alike, the two conditions co-operate, though in very unequal quantities. As we have just seen, repetition, if only in the form of recurrence of image, is needed to supplement the effect of attention. And, on the other hand, mere repetition, without some amount of interested attention, is ineffectual. Even the stupid advertisement possesses the momentary attractiveness of a sudden and exciting visual sensation. Many persons cannot distinctly represent even so familiar an object as their friend's face, just because they have never carefully attended to its several features, for their own sake, as a stranger would observe them.

(*b*) **Laws of Suggestion: Association.** When an impression has, under the influence of the above favourable conditions, been fixed on the mind there remains a predisposition or tendency to reproduce it under the form of an image. The degree of facility with which we recall any object always depends in part on the strength of this predisposition. Nevertheless, this tendency will not in ordinary cases suffice in itself to effect a reinstatement after a certain time has elapsed. There is needed as a further condition the presence at the moment of some second presentation (or representation) which serves to *suggest* or call up the image, or remind us of the event or object. Thus the sight of a building, as our old school, reminds us of events which happened there, the sound of a friend's name, of that friend, and so on. Such a reminder may be spoken of as the 'exciting' cause in contradistinction to the first or 'predisposing' cause. The reason why the large majority of our life-experiences, including our deeply-impressive dreams, are so readily forgotten

is that they are not brought into relation to other facts which would serve to remind us of them.

Now we are reminded of a presentation by some other presentation (or image) which is somehow related to, connected with, or, as we commonly express it, 'associated' with it. Thus it is plain that the events of our school-life are associated with the particular building which recalls them, and similarly the person with his name. Hence we speak of association as the second great condition of reproduction.

Laws of Suggestion: Contiguity.

Reproduction as Effect of Suggestion. The general nature of association has already been discussed. So far, however, we have only been engaged with it in its more rudimentary form, that is to say, as the process by which presentative and representative elements are perfectly integrated and unified into percepts. We have now to trace the workings of association in the higher domain of ideation, that is to say, in the succession of distinct psychical products, *viz.*, images or ideas. Association is the term commonly used to cover the processes or laws involved in the succession, flow or train of our thoughts.

It has been held by psychologists generally that the revival of images or ideas follows in all cases certain Laws, *viz.*, Laws of Association, or, as they have been called by some, Laws of Suggestion. Thus Hume regards them as filling in the world of mind a place similar to the universal Law of Gravitation in the physical world. It was shown by Hobbes that in cases where we pass from one idea to another in a seemingly disconnected manner there are hidden bonds of association to be detected by careful examination.[1]

Presentations may suggest one another in a variety of ways answering to different relations between them. Thus, if we let

[1] It is uncertain whether this associative revival is the universal form, or whether in certain cases there is also a spontaneous form of revival due to a direct action of the blood-supply on the central nervous elements.

A stand for the antecedent or reminder, B for the conseque or the representation called up, we see that A and B may corre pond to two objects locally connected, as two adjacent building or to two events following one another in time, as sunset and tl coming on of darkness; or, again, to two like objects, as a pc trait and the original. These various kinds of relation, or bon of connexion between presentations, have long since been 1 duced to certain comprehensive principles or laws.

Association of Ideas by Contiguity: Statement Law. Of the several distinguishable modes or varieties association the most important is that already touched on, *vi* Contiguity. By this is meant the association of two or mo presentations through, or on the ground of, their proximity time, whether under the form of simultaneity or of successio This is illustrated in such familiar experiences as the suggesti of the sensations of a cool plunge by the sight of a sheet of wate or that of a person's form, voice, and so forth, by the sound his name. This variety of association, which is recognised most psychologists as the principal if not the only one, eviden corresponds to that process of integrative association consider above. It may be roughly stated as follows: *Presentatio which occur together, whether simultaneously or in close successi tend afterwards to revive or suggest one another.*

This Law of Contiguous Association may readily be seen cover the larger part of our ideational connexions. Thus, includes (1) all merely temporal connexions, as those betwe simultaneous events, *e.g.*, sunlight and increase of warmth, successive ones, as the flash of lightning and the peal of thund Since causal connexion, whatever else it is, clearly involves quence of events, it is evident that the connecting of things wi their causes or their effects illustrates this bond of tempo attachment. (2) Again, the Law of Contiguity embraces object associations, or association of quality (not directly involv in the percept), use, and so forth, with things, as the voice o person with that person, the use of iron with that substanc (3) Once more, it covers all local associations, or those connexio

in which locality is a binding element; as the association of wild-flowers with the field or hedge-row, the meal with the table, the agitating thoughts of the examination with the sight of the examination-room. Locality, as has been recognised in ancient and modern times, is a powerful aid to revival. (4) As a last group we may take verbal associations, or those numerous connexions into which words enter, as names with objects, one word of a sentence with the related words, and so forth.

Conditions of Contiguous Integration: (*a*) Proximity in Time. To begin with, then, the Law of Contiguity plainly asserts that proximity in time, pure and simple, constitutes a sufficient ground of association. In other words, no real objective bond, as that of causal connexion between the facts presented, is needed for the generation of a contiguous cohesion. This is evident from the common observation that the most disconnected elements of experience, if they only happen to present themselves at the same time, are liable to become associated one with another. In this way we associate persons with places with which they hold no relation beyond the momentary one of having been there at a particular moment. This formation of accidental associations is specially conspicuous in the cases of children and the uneducated, whose minds have not come under the controlling influence of logical thought.

The degree of the efficacy of contiguity as a forger of the associative link turns on the proximity of the presentations. Thus, of all contiguous associations those between simultaneous presentations are strongest, as we see in the revival of the sound of a clock by the sight of the swinging pendulum. Similarly, presentations separated by an interval of time are less firmly associated than those which are strictly contiguous in time.

(*b*) Combining Movement of Attention. Mere proximity in time gives us only the limiting condition of contiguous suggestion. Many impressions, however, occur together without afterwards reviving one another. Thus a particular sight or sound may synchronise with a multitude of sensations, including the large group of organic sensations, and yet only enter into

effective connexion with one or two of these. A more special condition of contiguous association must be looked for in the process of attention. Just as attention gives vividness to the percept considered as an isolated psychical content, and thus favours its revivability, so it serves to bind together two or more of such contents.

The effect of attention on the process of contiguous integration is illustrated in the case of successive presentations, as the letters of the alphabet. Here, as is well known, suggestive revival takes place much more readily in the forward direction than in the reverse, the probable reason being that in the forward recall we are renewing the original order of the successive adjustments of attention. The action of attention on the order of revival is further illustrated in the selection under the lead of interest of a particular group from among a multitude of impressions, as when we successively fix the eye on certain interesting details of a landscape, the river in the foreground, the mountains in the background, etc., and afterwards recall these in the original order.

The formation of the associative bond will be more perfect the more immediate this transition of attention. Thus we associate the appearance and the name of a person when we bring them together as closely as possible and grasp them in one comprehensive act, or in rapidly successive acts, of attention.

(2) We may now pass to the other point in the action of attention, *viz.*, the effect of the quantity of attention bestowed. It is true of a conjunction of presentations, as of a single presentation, that the degree of retention varies with the intensity or vigour of the process of attention. The firm associations that are apt to form themselves in moments of excitement are explained by this circumstance. In watching a fire or other stirring and awful spectacle the several features of the scene are wont to cohere because of the preternatural vigour or energy of the observant process. Where, on the other hand, attention is feeble, as in much of our habitual listless survey of our street and other surroundings, the links of connexion are liable to remain half-formed and useless.

It follows from this action of attention in singling out and pinning together certain specially interesting parts of the presentation-complex, that the order of mental combination is not a mere reflexion of the external order. In the process of association the leadings of interest prompt us to build up out of the presentative materials given a new and particular order. And to this extent all memory, like art-construction, may be said to idealise the actual by a process of selective arrangement.

(*c*) **Repetition and Association.** As a last factor serving to determine the special directions and the strength of contiguous association we have repetition. Just as the renewal of a single percept strengthens the corresponding image, so the recurrence of two or more percepts in the same temporal conjunction strengthens the cohesive bond between them Most of our common retentions illustrate this effect. Thus the learning of the names of objĕcts, and of periodically recurring conjunctions and sequences of natural phenomena, as light and heat, a blow and a painful sensation, and so forth, is an effect of repeated co-presentation.

This effect of repetition may be conceived of in physiological language. If the excitation of two central elements simultaneously or in immediate succession tends (in some way not perfectly explicable as yet) to develop a nervous connexion or channel of communication between them, it would follow that the repetition of this process would serve to strengthen the nervous bond.

Recent investigation enables us to measure the effect of repetition with some exactness. It has been found that the effect of learning a series of (nonsense) syllables in shortening the process of re-learning twenty-four hours later may be expressed as follows Every three repetitions to-day effects a saving of one repetition to-morrow. The saving does not, however, continue in the same ratio when the number of repetitions is greatly increased.

A word may be added on the connexion between repetition and attention as joint factors in the formation of contiguous bonds. Repetition may, as was hinted above, be said to be a mode of increasing the amount of attention given to presentations. Yet the two conditions must be kept distinct, if only for the reason

that repetition as such modifies the attention. Thus juxtapositions of impressions that arrest attention on their first occurrence, especially those involving a striking contrast, as between two very unlike members of a family, or a big-sounding name and an insignificant-looking person, lose this attractiveness by their very repetition. On the other hand, repetition is in a certain class of cases a main condition in the awakening of attention to a conjunction. This applies to all cases where we are interested in discovering a general connexion. Thus a schoolmaster is struck by the *recurrence* of the juxtaposition of disorder and the presence of a certain boy or boys; the scientific observer, by the recurrence of the conjunction between the growth of certain plants and particular circumstances of soil.

Derivative Laws of Associational Revival. If now we combine what has just been said respecting the conditions of contiguous association with what was said above concerning the circumstances which favour the revival of presentations considered as separate units, we reach the following results, which may be regarded as a fairly complete account of the process of suggestion so far as we have yet considered it :—

(1) If we let A stand for the reviving presentation or suggestion, *b* the representation (corresponding to the presentation B) suggested, we may say, that the revival of *b* by A depends, first of all, on *the independent values of the two combining factors A and B.* Thus it is favoured by the strength (intensity and persistence) of A, as we see in the greater suggestive force which presentations have in general, as compared with representations. Again, it depends on the depth of the impression B as determined by its interest and its total repetition in varying connexions. To this it must be added that the *recent* occurrence of B is an important aid to its revival in all cases. Persons, places, and so forth are the more readily suggested by contiguous links when they have recently been presented.

(2) The revival of *b* by A will be the more certain and the more rapid the greater *the strength of the cohesive bond between them*, as determined by proximity, repetition, etc.

(3) It follows that if A is presented at different times with other concomitants besides B, as for example D and K, it will tend to revive not only *a*, but *d* and *k*. In this case there will be an opposition or inhibition of suggestive tendencies. Here then we must say that A's power of reviving *b* will depend on *the preponderance of the interest and the frequency of the particular conjunction over those of other conjunctions*, *e.g.*, A—D and A—K. A proper name instantly calls up the image of the place or person because the suggestive force works all in one direction. This is the most favourable situation. Next to this we have the situation of predominant interest and frequency, as when the general name island calls up our favourite island, the Isle of Wight.

It follows from this brief statement of the complex conditions of associational reproduction that it is a highly variable result. The same antecedent presentation, say the sound of a particular name, the sight of a particular person, is by no means always followed by one and the same ideational consequent. The result will vary with a number of variable conditions, as the subject's particular mental state, the tendency of a particular image to recur at the moment, and so forth.

Experimental Investigations into Association. Some interesting experimental inquiries into the workings of association have recently been carried out in England and in Germany. The special object of these experiments has been to determine what is called Association-time, that is, the time required for a presentation, as a spoken or written word, to call up a connected idea. Among the results reached are the following facts: Associations with words which reach back to early life recur most readily. The sound answering to a printed letter is revived by means of this last more rapidly than the name of a colour by the sight of the colour The association-time is in general less in normal than in abnormal conditions of mind.

Trains of Representations. As already implied, contiguous association binds together not only presentative couples but whole groups or aggregates. These aggregates may be combined on the ground of simultaneity, or, what is virtually equivalent to this, spatial co-existence, as when we group together a

number of historical events as happening in the same year or reign without reference to the order of succession among them, or when we link on a number of various experiences with one and the same place. Here, it is evident, no one order of succession is favoured over others. Thus the sight of a locality A will call up now the order *b*, *d*, *f*, now *f*, *b*, *d*, and so on, according to the variable circumstances of the moment.

In other cases, and these form an important class, the aggregates arrange themselves in a linear or serial form, so that we uniformly pass through the succession, A, *b*, *c*, *d*, etc. Such successions are called *trains* of images. A large part of our ideal acquisitions assume the form of such a train. Thus our representation of the regularly recurring series of natural phenomena, as the periodic succession of day and night, the seasons, and so forth, takes on this form. In like manner, a prolonged visible action, as that of a play, and a succession of sounds, as that of a tune, give rise to a representative train. As already pointed out, such series tend to be recalled in the order of the original presentations.

The above statement of the Law of Contiguity, which speaks of close succession, would suggest that each member of a series is associated only with its proximate antecedent and consequent. Thus in the alphabet series we commonly think of *p* as attached merely to *o* and to *q*. This, however, is not correct. Experiment shows that members of a series are associated also, though more loosely, with remote members. It follows that the revival of *f* in running over the alphabet is the result of the conjoint suggestive action of all the preceding letters. Similarly the beginning of the last line of a verse of poetry is recalled by the conjoint action of all the words in the preceding lines.

The effects of repetition in the case of such chains are very marked. The frequency of the succession tends, by the help of an organisation of the nervous processes involved, to an easy and semi-mechanical form of reproduction, in which attention to the several individual members of the series is at its minimum. This

may be illustrated in mentally running over the familiar series of the alphabet.

Composite Trains: Motor Successions. In nearly all instances of representative trains we have to do not with a single series of elements, but with a number of concurrent series. For instance, our representation of a play is made up of a visual series, answering to the several scenes and movements of the actors, and an auditory series, answering to the flow of the dialogue. The effect of repetition here, supposing the two series to be both interesting, is to bind together the several elements of each successive complex experience into one whole, and each of these wholes to succeeding ones. Thus each visible situation will become associated with the corresponding words, and this composite whole associated with what precedes and follows it. Frequent repetition tends to consolidate each successive group into one complex representation, so that the whole series approximates to a single series. Such complete reinstatement of a composite series is, however, difficult, as may be seen in the familiar experience that it is far easier to learn a series of words alone, or a melody apart, than to learn the words and tune together for singing purposes. Hence, perhaps, the tendency in recalling a composite series like that of a dramatic performance to revive with special vividness, now the visual, now the auditory train.

Among these recurring composite trains of images are those answering to our repeated or habitual actions. Every voluntary movement presupposes, as we shall see, an antecedent representation of that movement; and consequently where there is a succession of movements we must view each step as preceded by the appropriate motor image. Further, since the carrying out of a movement transforms the anticipatory motor image into the corresponding sensation-complex, it follows that in performing a series of familiar movements, as in dressing, or playing a tune from memory, we have each representative element immediately preceded and excited by an associated presentation; the whole series assuming the form m^1 M^1—m^2 M^2—m^3 M^3, etc., where M

stands for motor presentation, *m* for motor representation, and the horizontal line indicates suggestion by contiguity.[1]

Not only so, along with this motor chain there goes one or more series of purely sensory elements, also representative and presentative. Thus in walking there is not only the series of motor images and corresponding muscular sensations, but another consisting of the tactual images and sensations connected with the bringing of the feet alternately to the ground, and in most cases, too, a visual series arising from the changing appearances of the moving limbs, and of the ground. So in singing or speaking the succession of vocal (motor) representations is bound up with one of auditory images.

In general the motor elements are weak as compared with the sensory. Hence the train of motor representations may be said to depend on the presence of the sensory elements. Thus, in writing, the succession of manual movements is directed or controlled by the visual impressions. How much this is the case may be known by the simple experiment of trying to write in the dark.

The effect of frequent repetition of practice in such cases is to dispense with that close attention to the detailed elements of the composite train which was necessary at first. This is seen in the fact that the sensory elements which had first to be distinctly attended to become indistinct. Thus a young pianist learning her notes has at first to look at her fingers. Later on she can strike the notes with only an indistinct indirect glance at them. In this way practice tends, to a considerable extent, to render a chain of movements independent of sensory elements.[2] The

[1] This applies only to series of voluntary movements before they have grown automatic by habit. After this the representative element, *m*, may, as we shall see, drop out. It may be added that when we are merely imagining, and not actually executing, a familiar series of movements, the series will assume the simpler form M^1—m^2—m^3, etc.

[2] That the sensory elements are still present as indistinctly recognised factors is seen in the fact that a man who has lost skin-sensibility and so does not feel the touch of the ground has to look at his feet in order to walk.

final outcome of this repetition is a habitual or *quasi*-automatic action in which all the psychical elements, presentations and re-presentations alike, become indistinct.

Verbal Integrations. Among the most important of our associations are those of words. Language is the medium by which we commonly recall presentations. This arises from the circumstance that we are social beings, dependent on communication with others. If, further, it is remembered that language is the medium by which all the higher products of intellectual activity are retained and recalled, its importance will be still more apparent.

(*a*) **The Word-Complex.** A little attention will show that our common verbal acquisitions are highly complex results of contiguous association. To begin with, each element of a word is an aggregate of disparate sense-elements, *viz.*, the sound, the movements of articulation, and in the case of the educated the corresponding visual symbol. Of these the sound and the articulation are the fundamental portion. A child in learning to utter the sound *o* or *t* must combine a particular sensation of sound with the corresponding articulatory process as made known by its characteristic muscular and other sensations (*e.g.*, the sensations accompanying the closing of the lips, the moving the tongue against the teeth). This association as a psycho-physical process clearly involves the formation of a nervous connexion between the two distinct central regions of audition and articulatory movements.

The process of acquisition is that of motor association in general: certain sensations call up connected motor representations and through these bring on the actual movements. Thus a child that has learned to articulate *p* does so by first representing the sound, and along with this, the muscular sensations attending the corresponding articulatory movement. The importance of the sensation of sound as a controlling element in this process of articulatory reinstatement is seen in the fact that, in the case of those born deaf, articulation can only be learnt by substituting some other guiding sensation as the visual impression

received from observing the movements of the lips and other parts of the articulatory apparatus.

What we call a word is a serial combination of a number of such associated couples. Observation of children learning to speak, and of persons losing the faculty from disease or old age, shows that the firm retention of the members of such a series in their proper order is a matter of some difficulty, presupposing practice, and the integrity and proper working of certain nervous arrangements.

(*b*) **Ideo-verbal Integration.** A word, however, is more than a series of auditory and motor complexes. It involves the association of this series with a particular image or idea. This association again depends on a further process of central nervous formation, the connected elements of the auditory and articulatory centre being conjoined with certain elements in the particular centre of ideation involved.

The relation of the word-complex to the idea illustrates the strongest form of contiguous attachment. As we all know, the word, especially when actually spoken or heard, and not merely imaged, is apt to call up the associated idea with exceptional vividness. In early life, when names are signs of concrete or pictorial ideas, this verbal suggestion of imagery is particularly powerful. This is due in part to the childish tendency to 'reify' the name, that is, to regard it as a part of the real thing itself, instead of something extraneous and arbitrarily attached to it.

It is somewhat uncertain how far the several elements of the word-complex enter into our word-aided ideational processes. That the auditory and motor (articulatory) factor are the fundamental part of these reproductions seems to be pretty firmly established. The prominence of the motor element is illustrated in the tendency of children, the uneducated, and of all of us when excited, to "think aloud". Yet there seems to be considerable difference in this respect among individuals.

(*c*) **Ideo-verbal Series.** The verbal complexes just spoken of, together with their associated ideas, are capable of being further integrated into series answering to the intelligible structures of language. To learn language necessarily involves these

serial formations. Not only so, but as will appear by-and-by, our power of following out trains of ideas or of thinking is limited by the stock of such verbal acquisitions. In all our more difficult thinking operations words play a prominent part.

The formation of such verbal series has for its conditions those of composite trains in general. First of all, the integration of the several word-complexes is presupposed. A child cannot arrange words in an intelligible order till he has firmly associated the parts of the word-complex one with another and the whole complex with the idea. When this rudimentary part of the process is mastered, the linking on of words and ideas in series turns on a careful attention to words in their order of succession, as also to the relations of time, place, and so forth, among the ideas expressed by this order.

It is here assumed that the verbal trains are compounded of words and their associated ideas. Learning, in the technical sense, *i.e.*, *learning by heart*, involves this double chain. At the same time, the two series are by no means equally prominent in all cases. As every teacher knows, words may be strung together and reproduced with only a very faint accompaniment of ideas. This result turns on the facilities with which the verbal complexes are serially integrated, especially in the early years of life. This is best illustrated in that mode of acquisition much decried by Locke and other educationists, *viz.*, *learning by rote*. At the same time it must be remembered that verbal cohesion constitutes a valuable support of the reproductive process even where the ideas are also retained. This is illustrated in the fact that Macaulay and other men of wide and accurate knowledge have been distinguished also by the fulness and exactness of their verbal reproduction.

Memory and Expectation. Our images and trains of images are commonly accompanied by some more or less distinct reference to the corresponding presentations, and to the time-order of their occurrence. This complete representation of presentations or sense-experiences in their time-relations involves a further intellectual element, to be dealt with by-and-by, *viz.*, a

belief in the corresponding events as real occurrences. In some cases, no doubt, this accompaniment is of the vaguest kind. In a state of listless reverie we may have a series of images without any distinct reference to the corresponding experiences. We simply picture the objects, without reflecting where or when we have seen them or shall or might see them. In other cases, however, we distinctly refer the images to some place in the time-order of our experience. This reference assumes one or two well-marked forms: (*a*) a reference to the past or memory, or, to describe the process more fully, memory of events, and (*b*) a reference to the future or expectation.

Both memory and expectation involve a series of images succeeding one another in time, and both illustrate the suggestive force of contiguous association. Thus in remembering the events of a particular day we retrace the succession of experiences, the images of these following in the order of the events, and being temporally 'localised' in this order. Similarly, in anticipating the succession of the events of a journey resembling one already performed, we pass over a succession of images having the same time-order as the events of which they are the representations, and held together by the bond of contiguity.

While thus both modes of associative suggestion, they are different modes. In the case of memory the images are projected backwards in time, or are *recognised* as representing past experiences; in the case of expectation, on the other hand, they are projected forwards, and the presentations viewed as following the present actual one. The nature of this difference will be discussed more fully presently.

Again, memory and expectation, though both modes of belief, are perfectly distinct modes. Since in memory we have to do with a reality which is over, the mind is in a comparatively passive attitude with respect to it. The train of memory-images may indeed excite faint feelings of regret or longing, but these are momentary only, and we resign ourselves to the fact that the events are past. In expectation, on the other hand, the mental attitude is one of strenuous activity. There is a preparatory

fixation of the attention, and, further, a readiness to act in conformity with the expected occurrence.

REPRESENTATION OF TIME.

Perception and Idea of Time. We have already considered the process of time-apprehension in its simplest form, commonly spoken of as a perception. It remains to inquire into the higher form of time-consciousness, *viz.*, the representation or idea of relations of succession and of duration. This time-consciousness, in its most developed form, is one of the most elaborate of intellectual products, involving processes not yet dealt with. Nevertheless, inasmuch as it is based on the contiguous association of successive presentations, it may be convenient to deal with it at this stage.

It is difficult for us at first to conceive that a child could ever have had a succession of unlike experiences and not instantly referred these to their positions in the time-order as before and after. Yet there is every reason to think that the knowledge of time is a somewhat late acquisition. In its developed form the representation of events in their temporal order is attained much later than that of objects in their spatial or local order. Thus a child of three and a half years, who had a very precise knowledge of the relative situations of the several localities visited in his walks, showed that he had no definite representations answering to such time-divisions as 'this week,' 'last week,' and still tended to think of 'yesterday' as an undefined past.

Consciousness of Succession. The representation of time begins with the recognition of two successive experiences as such. This, as already remarked, implies, in addition to the mere fact of succession, a subsequent mental process, *viz.*, a *representation of antecedent and consequent together as successive.* And this again, as we saw also, presupposes the persistence of presentations for an appreciable period, and an overlapping of the image of a preceding sensation with the actual sensation of

the moment, and, as a condition of this, an overlapping of the correlated nervous processes.

The first apprehension of a time order in our experience involves the contrast of presentation and representation, of percept and idea, already spoken of. All arrangement of psychical elements in time is an ordering of representations in relation to an actual present.[1] The simplest form of such arrangement is the relating of a represented experience as immediately antecedent or consequent to the actual present one; and the most elaborate time-construction is but an expansion of this process.

Representation of Past and Future. The simplest form of time-representation would seem to arise in the following way. A child is watching some interesting object, say the play of the sunbeam on the wall of his nursery. Suddenly the sun is obscured by a cloud and the marvel of the dancing light vanishes. In place of the golden brilliance there now stands the dull commonplace wall-paper. This cessation, however, as we saw above, does not imply a total disappearance of the presentation. It persists as image, and attracts the attention by reason of its interestingness. At the same time there is the actual present, the sight of the sunless wall. Here, then, both presentation and representation, the actual experience of the *now*, and the represented experience which is *not-now*, occur simultaneously, and so supply the most favourable conditions for the development of a consciousness of their difference or contrast.

Not only, however, would a 'now' and 'not now' be distinguished in this experience. The representation *a* and the presentation B would, in the case supposed, tend to group themselves in a certain temporal order. Every time the attention was recalled to *a* (by reason of its persistence and interestingness), it would

[1] Strictly speaking the actual present is an unreal abstraction. It is a sort of mathematical point which is continually changing, and has ceased to be present before the process of attentive reflexion on it is developed. What we are in the habit of calling the present is the sensation-complex of the moment together with its escort of representative elements answering to immediately preceding and immediately succeeding presentations.

tend (following the direction of its movement in successively fixing the presentations A, B) to be carried on to B. That is to say, *a would take up its place as an antecedent to B*, and the relation of the corresponding presentations A, B, would thus be represented as a transition from A to B, and not conversely. And this apprehension would be aided by the fact that *a* declines in intensity and distinctness, while B, as the actual presentation, persists intact, and so gains in force relatively to *a*. In this way we may suppose the vague representation of a '*not-now*' to be developed into the more definite representation of a '*no-longer*'.

Let us now take the case of anticipation. The representation of a future may be supposed to arise, like that of a past, in connexion with an actual present. Here, it is obvious, the previous occurrence of the succession is presupposed. A presentation A calls up a representation *b* as its consequent, because the sequence A—B has occurred before, and the two presentations in consequence become associated. Now, if there is an interval between the calling up of the image and the realisation of the corresponding percept, there are the conditions for the genesis of a representation of a future.

In order to retrace the process, we will imagine the situation of a hungry child who sees all the preparations of his food. Under these circumstances the representation of the pleasurable experience of eating is suggested by strong contiguous links. Here again, then, there are all the conditions for noting the contrast of presentation and representation, the realised 'now' and the unrealised 'not-now'. In this case, however, the relation of representation and presentation would be apprehended as different from that in the first case. During the prolonged existence of the two in mental juxtaposition, the child would discover that every time the actual presentation A rose into distinct consciousness it would be followed by the representation *b*. The presentation and representation would thus assume a different temporal order in this case from that taken up in the first. Through repeated mental transitions from A to *b*, moreover, *b* would gain in force, and not lose, as in the former case. Here, then, the vague

representation of a '*not-now*' will be differentiated into the representation of a '*not-yet*'.

The representation of a number of successions, or of a time-series, would take place in much the same way, in connexion with an actual presentation. Suppose a series of presentations A, B, C, D . . . H. Then when the presentation H occurs, the representations *a*, *b*, *c*, *d*, etc., may, as we have seen, still persist in consciousness. Now, in considering in rapid succession such a group of images, the attention is (as was pointed out above) determined to a certain order. Thus, it moves easily and smoothly in the order *abc*, but only with difficulty along another order, say *cba*, or *cab*. Hence the particular temporal order assigned to the events. In this case, too, the differences in the intensity of the several images, which are due to the fact that certain members of the sensational train having occurred longer ago have become more effaced, would make themselves felt, and serve as additional "temporal signs," or clues to the temporal order of the events.

Representation of Duration. A second aspect of time, over and above mere succession, is duration. This aspect is given from the first, along with succession. As pointed out above, all sensations are apprehended as lasting or occupying so much time. Similarly with ideas and other psychical states. The sense of duration shows itself commonly as apprehension of *interval between sensations*, *e.g.*, those of two clock-strokes.[1] And so our several experiences come to be thought of not merely as preceding or succeeding another, but as each occupying so much time, and further, as separated from one another by certain time intervals or distances. In other words, time, like space, is made up of relations of position and of distance.

It is, however, only after a certain range of experience, and a certain development of reflective power, that a child begins to be distinctly aware of time as duration. As long as his sensations and thoughts are all-absorbing, and attention is not called off to the fact of duration, he remains unconscious of it. In order to the development of this consciousness of time, there must be something in the experience which serves to divert the attention to this

[1] Such intervals are probably measured by help of persistent organic and other sensations.

particular aspect of it. A child, for example, might be led to this kind of reflexion when told to wait for the satisfaction of an expressed wish. In this situation of prolonged anticipation, an attitude at once difficult to maintain and very fatiguing, we may suppose the first vague consciousness of duration to arise in connexion with a feeling of tedium or *ennui*.

That the appreciation of duration begins in this way may be seen by observation of children, who first speak about 'long time' and 'short time' with reference to strongly desired futures. It is further illustrated in the familiar fact that we all realise duration most vividly when called on to wait for something in circumstances that offer no distractions, as for a train at a railway station. With this vivid and exaggerated sense of duration there contrasts the underestimation of it during other and more especially deeply interesting and absorbing experiences.

So far we have spoken of the consciousness and estimation of time during the period concerned. From this contemporary estimate we must distinguish the retrospective and the prospective apprehension and measurement of duration. As is well known, this is not identical with the first. The waiting at the railway station, which seemed so long while it lasted, looks short enough afterwards; and a day's holiday, which is boundless to the sanguine anticipation of a boy, seems to shrink painfully as it is taken possession of.

Here the other aspect, *viz.*, time-succession, comes in as a factor in the time estimation. We seem, no doubt, to be able to estimate time to some extent by means of a persistent unchanging sensation, as in judging of the duration of a tone; yet change is certainly necessary for defining a duration, just as a sensation of contact is needed for limiting the extent of (empty) space. Not only so, in all our more complex representations of time duration of single experiences, and succession of experiences, are both involved. Thus it is well known that in the retrospective and prospective estimate of time the number of represented elements forming the content of the period directly affects the result. Days or weeks, filled with many new, striking, and interesting

experiences, appear, on that account, both in prospect and in retrospect, exceptionally long.[1]

The Temporal Scheme. Our complete representation of the time-order whether past or future is that of a succession of experiences or events having a certain duration, and lying at certain distances or intervals one from another. In this way we represent the events of a particular week, the successive incidents of a tour, and so forth. This complex representation is only acquired after a considerable development of the power of reproduction and of reflexion. It involves, in addition to reproductions of individual experiences, a comparison of their order with that of others' experiences. A word or two must suffice to indicate the course of this development.

With respect to the temporal order of our experiences we are all aided greatly by certain conventional arrangements, more particularly the divisions of time into periods, as years, seasons of the year, months, weeks, days, and sub-divisions of these. This arrangement enables us to date any experience we are able to fix in our minds by attaching it to a particular division. Our common experiences are in this way ordered similarly in a common time-scheme. Thus, all members of a family come to think of an event of common interest, such as the migration into a new home, as having happened at a certain date. By help of this same common time-scheme the individual is able to retrace portions of his past which are only very imperfectly revivable.

This constructive process is completed in the case of all of us by a common reference to an "objective" standard of time, which answers to a constant (or approximately constant) time-experience of ourselves on different occasions and to a similar time-experience for ourselves and for others. Such a standard of

[1] It is to be noted that even in the estimation of the duration of persistent sensations, as tones, change is always present in the rhythmic rise and fall of attention and of the concomitant sensations (*cf.* p. 86). For a fuller account of the variations in our subjective estimate of time or duration, see my volume, *Illusions*, chap. x. p. 239 ff., and chap. xi. p. 302 ff.

reference seems to be found in movement and, more particularly, visible movement, *e.g.*, of the sun, of the clock.

The representation of the future is, of course, still less complete than that of the past. Here we have not even that fragment of a definite series of events which we have in the case of recalling a portion of our past life. Our future is only susceptible of a dim forecast. Yet, even here, the formation of the common time-scheme just referred to enables us to move forward in imagination through a succession of periods in which imperfectly represented changes of age, surroundings, occupation, and so forth, with the correlative changes of feeling, form the serial content.

Remembering Events. The development of the temporal scheme here briefly described renders possible the process of Remembering in the complete sense of this word, *viz.*, a definite recalling of a particular event of the past. In this case the memory-image is definitely referred to a particular portion of the past, and localised or placed in its proper temporal settings. Thus we remember an examination, a tour abroad, when we localise the occurrence, say, in a particular month of a particular year, and connect it with what preceded and what followed it.

It is this definite reference, too, to the time order of the past which underlies the sense of personal continuity, or, as it is generally called, 'personal identity'. It is only in the measure in which we can mentally run over a succession of prominent past experiences as framed in the time-scheme that we acquire a clear idea of a continuous flow of consciousness, or of a mental life.

Much of our so-called remembering falls far short of a precise localising of events. We have a vague sense of pastness and that is all. This condition of incomplete or fragmentary reproduction is illustrated in the processes of *Recognition* already dealt with. To recognise an object, a name, is to have along with a given percept or image a sense of its representing something which has gone before. It is to be added that where a past presentation has occurred again and again and with different concomitants the recurrence of it fails to recall any particular date and group of

experiences, just because the several suggestive tendencies inhibit one another. In hearing a familiar word, in looking at a book we often use, we *recognise*, that is, have a vague sense of past acquaintance, but do not recall any particular previous occurrences with their distinctive temporal concomitants.

Other Forms of Suggestion.

We have now completed our account of the reproductive process so far as the Law of Contiguous Association is concerned. As pointed out in our general account of association, this refers mainly, if not exclusively, to the integration of presentative elements which fall together in the time-order of our experience.

Suggestion of Similars. At the same time, all suggestion does not take the form of revival by links of contiguity. When, for example, a photograph calls up an image of the original person or locality, or when a word in French or Italian calls up the parent word in Latin, the succession is commonly said to follow, not the (external) order of time, but the (internal) order of likeness or similarity. And from the age of Aristotle downward the Laws of Association have, by the majority of writers, included a special Law of Similarity. We have now to examine into the nature of this process of suggestion, and to define its relation to the process of contiguous suggestion already dealt with.

In the first place, then, we must distinguish this process of suggestion from that of automatic assimilation already considered. In order that there be the suggestion of one representation by another, they must, it is evident, be in a measure distinct. That is to say, the similarity in this case is incomplete. The portrait and the original, though similar in certain features or aspects, are dissimilar in others. Hence we have in this case a succession of partly dissimilar representations, or a distinct process of revival of one representation by an antecedent one. It may be marked off from Automatic (*i.e.*, coalescent) Assimilation as a process of Suggestive Assimilation.

This suggestion of a representation by its similar is immediate, and does not depend on a clear consciousness of the similarity. In many cases we are reminded by one face, one locality, one work of art, of another, without being able at once to detect where the similarity lies. Where the consciousness of similarity grows distinct it is as a subsequent process.

It is evident that we have here to do with a process apparently different from that of contiguous association. We have not, as in the last case, two psychical elements attached or bound together on the ground of their having been originally presented together, or having formed adjacent elements in the tissue of our experience. The whole ground of the suggestive process is here the fact of similarity. The relation between reviver and revived would, accordingly, in this case, have to be symbolised thus: $D \rightarrow \delta$; or thus: $\begin{cases} B \\ A \\ C \end{cases} \rightarrow \begin{cases} k \\ a, \\ l \end{cases}$ rather than thus: $\underset{b}{A \rightarrow (a),}$ which form we found to be fitting in the case of contiguous cohesion. Hence the word association seems to be inappropriate here.

Nature of Assimilative Suggestion. Let us now inquire a little more closely into the mode of working of this "Attraction of Similars" as it has been called. To begin with, then, since the attractive force resides in the fact of similarity, we may expect that it will vary with the amount of the similarity, and this is what we find. Where two presentations are closely similar, as in the case of two voices very like in timbre, there the tendency to revival will be strong. A number of common features in two objects is a known aid to assimilative revival. We identify a person after an interval of absence by a complex of similarities, as form, expressional movement, voice, and so forth. Speaking generally we may say that, according to the principle now dealt with, *presentations tend to revive one another in the proportion in which likeness preponderates over difference.* This will be aided, as in the case of contiguous reproduction, by the strength of the

reviver and the readiness of the image (through depth, recency of impression, etc.) to recur.

The attraction of similars exerts a marked influence on the flow of our ideas. The sights and sounds that meet us tend now to revive contiguous adjuncts, now to suggest similar sights and sounds in our past experience. Where we fail to detect the presence of a link of contiguity connecting two successive representations, a thread of connexion may often be found in some point of likeness. This action of similarity, moreover, being unlimited by time and circumstances, has a wide scope. It serves to connect not only sensations of the same class, but even disparate sensations. In what has been called the "analogy of feeling," as when a certain effect of colour reminds us of an analogous effect of tone, we have an example of this far-reaching influence of similarity.

Assimilative Integration. Although assimilative revival is not in itself a true process of association it gives rise to such. When a presentation KAM recalls another PAQ the immediate succession of the two in consciousness secures a certain amount of contiguous cohesion between them. We all know that after mentally bringing together, for example, two faces, and recognising their likeness, we tend to connect the two habitually. This effect of connecting similars brought together in consciousness may be marked off as assimilative integration.

Such assimilative integration plays a certain part in the acquisition of our concrete knowledge, and is a still more important factor in the building up of our thought complexes, *viz.*, general notions and judgments. The latter of these effects will have to be considered later on. A word or two may here be added on the former.

When we say that learning is assimilation we mean that it takes place largely by help of assimilative suggestion. Thus, in learning the German word Vogel we are apt to recall fowl, and by thus attaching the new to the old acquisition by a link of likeness we greatly expedite the process of retention. The new and strange fact becomes incorporated with familiar facts, and acquires some-

thing of the interest of these. Thus the hard repellent-looking foreign word takes on a friendly mien when assimilated to some homely vocable; the dry historical fact becomes vivid and striking when brought into analogy with some interesting fact of the present day, and so forth. Hence a firm integration of the two; and, as a result of this, a strong retention of the new fact.

Relation of Suggestion by Similarity to Contiguous Suggestion. We have thus far marked off, as sharply as possible, suggestion by similarity from suggestion by contiguity; and this on the ground already pointed out, that they answer to two perfectly distinct directions of the reproductive process. The latter, as we have seen, tends to a reinstatement of experience-wholes, or time-connected aggregates, in other words, to a reproduction along with each presentative element of its experiential context. The former, on the other hand, brings together elements of experience not necessarily connected in time at all, but lying, it may be, very remote in the time-order. Or, to express the contrast in another way, we may say that associative (contiguous) reproduction is *externally* conditioned, *viz.*, by the time-proximity of the original presentations, whereas assimilative reproduction is *internally* conditioned by the psychological (or psycho-physical) relations of the presentations.

At the same time, it follows from what was said in a previous chapter on the unity of the elaborative process as a whole, that the two modes of reproduction are mutually implicated. All contiguous suggestion, as we there saw, begins with a process of automatic assimilation. When the sight of a flower recalls an odour, a particular locality, or a romantic experience, it is because this visual presentation is assimilated to one or more like previous ones. On the other hand, as already pointed out, similarity is never the only reviving circumstance. When, for example, one face recalls another similar one, the revival is assimilative only so far as certain like or common features of the two objects are concerned. All that is revived beyond this, the unlike concomitants of expression, figure, dress, habitation, and so forth, is the work of contiguity.

The symbolic representation of the assimilative element in contiguous reproduction was given above (p. 108). The co-operation of contiguous suggestion in what is commonly called the revival of similars may be symbolised thus:—

$$\left\{\begin{matrix} \mathrm{A} \\ \mathrm{X} \\ \mathrm{B} \\ \text{etc.,} \end{matrix}\right. \rightarrow \left\{\begin{matrix} p \\ \vert \\ x \\ \vert \\ m \\ \text{etc.} \end{matrix}\right. ,$$

where the group of capitals stands for the reviving presentation-complex, and that of the small letters for the revived images. Here the assimilative part of the process is expressed by the letters $\mathrm{X} \rightarrow x$;[1] while the other and contiguous part of the reproduction, or associative revival proper, is indicated by the smaller letters and their connecting lines.

Yet while both compounded of the same elements, *viz.*, assimilative and associative revival proper, the two operations commonly described as suggestion by contiguity and by similarity are, in general, readily distinguishable. In what is called contiguous suggestion the assimilative step in the process, being automatic and instantaneous, is slurred over and lost sight of, the associative revival of concomitant elements being the striking part of the process. These concomitants, moreover, are kept distinct from the reviving presentation. On the other hand, in assimilative suggestion the process of assimilation, with its concomitant, *consciousness of similarity*, is the conspicuous part of the whole operation. The difference between the two processes may be symbolised thus:—

$$\begin{matrix} \text{Contiguous} \\ \text{Suggestion,} \end{matrix} \; \mathrm{A} \rightarrow \begin{matrix} (a) \\ \vert \\ \pi, \text{etc.} \end{matrix} \qquad \begin{matrix} \text{Assimilative} \\ \text{Suggestion,} \end{matrix} \left\{\begin{matrix} \mathrm{C} \\ \mathrm{A} \\ \mathrm{D} \end{matrix}\right. \rightarrow \left\{\begin{matrix} m \\ a \\ k. \end{matrix}\right.$$

Suggestion by Contrast. In addition to that of similarity another principle of suggestion known as contrast is commonly laid down. By this is meant that one impression or presentation tends to call up the image of its opposite or contrast. Thus it is said that black suggests white, poverty makes us think of wealth, a flat country reminds us of a mountainous one, and so forth.

It is, however, extremely doubtful whether contrast as such constitutes a bond of attraction among representations. On the contrary, it would rather appear that contrast between two representations, merely as such, leads to an opposition and a mutual

[1] To meet the case of the imperfect similarity of X and x, it would be necessary to use letters not regarded as identical, say B and the Greek β.

hindrance. In the play of conflicting suggestive tendencies, to be spoken of presently, it will be found that presentations tend to exclude the simultaneous rise of all unlike, and therefore all contrasting presentations.

(*a*) In the first place, suggestion by contrast seems to owe its force mainly to the circumstance that *all knowledge of things begins with discrimination*, with a noting of broad differences or contrasts, such as bitter and sweet, and more particularly those involved in such correlative pairs as rich and poor, heavy and light, tall and short. Not only does the mother or teacher begin to instruct the child by pointing out these contrasts to him, he spontaneously brings one thing into contrast with another, or views it in that relation, as when he says, 'This is a hot plate, this is not a cold plate'. This initial bringing together of contrasting presentations for purposes of cognition is aided by the common forms of language which serve for a like reason to connect opposite qualities. In this way contrasting ideas do, undoubtedly, become associated, but only as the result of conjoint presentation, *i.e.*, contiguous association.

(*b*) In the second place, similarity appears to play a subordinate part in suggestion by contrast. When, for example, a sour taste makes us think of a sweet one, it is evident that the two impressions are so far alike that *they constitute members of the same class*.[1]

(*c*) This intellectual association of contrasting presentations and ideas is further aided by *a special feeling of interest in the relation*. To see a bright and a dark colour, or a large and a small object, in juxtaposition is, as we have seen, impressive, and serves to excite attention to the two, and so to connect them by a contiguous bond. This interest of contrast is still more conspicuous in the case of all those presentations and representations which are strongly coloured by a concomitant of feeling, *e.g.*, wealth and

[1] Suggestion by contrast is sometimes based on similarity as its main ground: but this appears to be an exaggeration. As *extremes within the same class* contrasting sensations present more of dissimilarity than of similarity.

poverty, sickness and health, and so forth. Hence, further, the large use of contrast in poetry and in art generally

It follows from our analysis that contrast plays a subordinate part in retention and reproduction. Its chief function in connexion with these processes is to intensify attention to certain juxtapositions of presentative elements, and so to secure a firmer hold on these.

The three modes of suggestion just dealt with, Contiguity, Similarity, and Contrast, were distinguished by Aristotle. In modern times the tendency has been to simplify these principles. Thus, Contrast is now generally admitted not to be an elementary law of suggestion or 'association'. Further, we find that from the time of Hartley, the founder of the modern English doctrine of association, there has been a disposition to relegate similarity to a secondary place. This was attempted in a forced way by Jas. Mill, who held that we 'associate' like things because we are accustomed to see them together. More recently in England and in Germany we see a tendency to strike out suggestion by similarity altogether. According to this view all similarity is partial identity. When a portrait recalls the original it is because certain ingredients in the earlier experience are already present in the later. Hence all that suggestion does is to revive the former concomitants of this common element. On the other hand, Herbert Spencer reverses the process and seeks to resolve contiguity into similarity by regarding experiences taking place at the same time as similar under their temporal aspect. It may be added that Hamilton and others, while admitting both contiguity and similarity, view them as constantly co-operating, and so bring the whole process of suggestion under one principle, *viz.*, *redintegration*, *i.e.*, *reinstatement of wholes*.[1]

Simple and Complex Suggestion. So far we have been confining ourselves in the main to the process of suggestion viewed as a simple operation. That is to say, we have supposed that a particular presentation A has a connexion with only one re-presentation, say *a*, or *b*, and tends consequently to suggest this last exclusively. But a little consideration will show us that this

[1] For the view that all suggestion is due to contiguity the reader may consult W. James, *Psychology*, p. 268 ff. H. Spencer's view is set forth in his *Principles of Psychology*, vol. i. pt. ii. chap. vii. Hamilton's Law of Redintegration is expounded in his *Lectures on Metaphysics*, xxxi.

is, strictly speaking, never the case. If we confine ourselves to the process of association proper, *viz.*, contiguous integration, we see that a presentative element is never given with only one concomitant element. Every impression that reaches us has contiguous relations to other impressions of the time (simultaneous, antecedent, and consequent), including all the organic sensations, feelings, and other states of the moment. Since, moreover, the same (*i.e.*, approximately indistinguishable) presentations recur at different times and with different concomitants the variety and range of association and suggestive tendency are still more enlarged. The odour of a violet, the sound of a friend's voice, a particular word in common use, come in this way to enter as a common factor into a large variety of connected wholes.

The psycho-physical process of associative integration is here analogous to the weaving of an intricate net-work, in which each element forms a knot connected by a variety of threads with other similar knots. Following the common physiological hypothesis, we may suppose, indeed, that the several clusters of central nervous elements answering to different presentations do in this way become mutually attached by numerous radiating fibrous connexions.

If, now, to this varied play of contiguous association we add the suggestive tendencies of similarity, we shall materially increase the complexity of the process. A given presentation, say a particular pose or voice-inflexion in an actor, may thus connect itself not only with many separate concomitants, locality, temporal circumstances, etc., but also with a number of like presentations, *viz.*, previous perceptions of a similar pose and tone in the same or in other actors. And through these last, moreover, new and manifold directions of contiguous association will be opened up corresponding to the particular concomitants of each of these previous presentations.

This fact of the complexity of the suggestive process may be viewed under two distinct aspects, or in respect of two dissimilar effects.

Divergent Suggestion. The first and most obvious

result of this intricate reticular arrangement of our presentative elements is that no presentation is suggestive in one direction only. In other words, all presentations exert a tendency to a multiform or divergent mode of suggestion. Thus, the sight of a familiar room, or the sound of a familiar name, tends to call up a number of images. Since these cannot all be revived together, there results a conflict of suggestive tendencies.

If, now, in this conflict one suggestive tendency greatly predominates over the others in strength the conflict is at once resolved: *the more potent suggestive tendency inhibits the rival tendencies*. Thus, in learning the meaning of a word, as 'head,' a child comes, after sufficient repetition, to recall in connexion with it only the constant part of the associated idea, *viz.*, the general notion or concept, and no longer the variable accidental accompaniments, answering to particular varieties of form, as the human head, the bird's head, etc.

Convergent Suggestion. This brings us to the second effect of the complexity here dealt with. The process of reproduction is never, strictly speaking, brought about by a single presentative element. As pointed out above, our presentations are complex. Thus, the presence of a person announces itself by a highly complex group of visual and auditory impressions, any one of which may assist in reproducing some presentation associated with the person. All reinstatement of a past presentation is the cumulative effect of a number of such co-operant suggestive forces. This co-operation of suggestive tendencies in reinstating a particular presentation may be described as Convergent Suggestion.

The process of convergent suggestion assumes a peculiar form in the case of the composite trains already spoken of. When a child learns to repeat a poem from memory we see a number of co-operant tendencies at work. Thus, a given word-sound W^1 tends to revive the proximate member of the sound series W^2. At the same time, it will revive the correlative idea I^1, and this last will co-operate as a new suggestive factor, tending to revive the connected idea I^2. In this way, as we know, a child recalls

the next word, now by the sound cohesion, now by the help of the ideal connexion as well. Not only so, in recalling a series of such ideo-verbal complexes, the revival of a particular member of the train is not the mere result of the suggestive force of its immediate predecessor, but is *a resultant of the sum of suggestive tendencies of the whole string of preceding words.* Only in this way can we account for the fact that a poem or tune which has phrases common to it and other poems or tunes reproduces itself without confusion with the other trains. In like manner, assimilative suggestion is commonly a complex process. In identifying a person, for example, after a long interval, the revival of the image is a process occupying an appreciable time, and illustrating a like cumulative operation of suggestive stimuli, as a particular movement of the features, tone of the voice, and so forth.

Finally, it is to be noted that the two processes of assimilative and contiguous suggestion may combine in effecting the revival of an image or image-complex. As pointed out before, contiguous suggestion always includes an assimilative factor; and as soon as this latter element grows distinct in consciousness we have a recognisable case of co-operant similarity and contiguity. This is exemplified in that common form of operation called variously the recognition, the classification, or, by Herbart and his followers, the Apperception of an object. Thus, in recognising a person or a place after a considerable interval, the process frequently commences with a revival by assimilative suggestion of a vague typical outline of the original, which outline gets filled in with details gradually or suddenly by contiguous suggestion. The same co-operation is still more apparent in constructive reproductions, as they may be called, as when a *savant* completes the idea of an animal from an observation of a part of its skeleton.

Besides these combinations of assimilation and contiguous suggestion which constitute connected intellectual processes, there are others of a looser and a more accidental kind. Thus, in recalling a person's name, contiguous suggestion is frequently aided by the assimilative force of another like name which we

happen to be thinking of at the moment. Still more plainly is this fortuitous co-operation illustrated in the common case in which a speaker or a writer gets his current of ideas directed to a particular simile by the aid of the contiguous promptings of the locality and surroundings of the moment. The similes of Wordsworth, hardly less than his descriptions, are a key to the kind of locality in which he lived.

Reproduction as a Resultant of a Sum of Tendencies. If, now, we combine what has been said respecting the frequent co-operation of a number of suggestive stimuli with what was said above on the action of the varying strength of the psycho-physical tendencies to revival, according to the energy of the original impression or series of impressions, and to recency of impression, we shall see that the actual working of the reproductive mechanism is exceedingly complex, and widely variable from moment to moment. Every reproduction of an image or image-group is a resultant of a system of psycho-physical forces, partly stimulatory, and partly inhibitory, acting at the moment.

It follows that our ideational successions betray a high degree of variability from moment to moment. Thus, as every traveller knows, we are far less prepared to recall a French or German word when we are called on to give it at home, than we are after spending a week or two in the country where the language is spoken. In the latter case the tendency to revival has been strengthened by the whole experience of hearing and speaking other words bound up with this one in a particular associative group or system.

Active Factor in Reproduction: Recollection. We have thus far considered the process of reproduction merely as a passive and mechanical one. That is to say, we have supposed that the several suggestive tendencies do their work without any conscious active co-operation on our part. And this purely automatic reinstatement of images does undoubtedly occur. We all know what it is to have an idea revived suddenly and forcibly without our actively contributing to the result. The rapid and vivid reinstatements effected by locality illustrate such passive re-

production. In our idle moments, in dreamy contemplation of natural objects, and in twilight reverie, we seem to be merely the sport of suggestive forces, our thoughts being led hither and thither without any exertion of our own.

Such a purely passive process of reproduction is, however, comparatively rare. In most cases an effort of attention enters into the stage of reproduction, as into the stage of acquisition. This actively controlled process of reproduction is best marked off as Recollection. We have now to inquire into the nature of the process as thus further complicated. Without attempting as yet to account for the action of attention itself as the result of willing or volition, we may inquire into the way in which attention interferes with and modifies the mechanical processes of reproduction as just considered.

To begin with, then, the action of attention does not effect a reinstatement of an image independently of the forces of suggestion. All that it can do is to modify this action in various ways, and to aid in the realisation of certain of these tendencies rather than of others.

(*a*) **Fixation of Ideas.** The first thing possible here is the direction of attention to a representation partially revived, or sub consciously present. In many cases we half recover an image, *e.g.*, of a face, by help of certain suggestive forces. Here, when special interest is excited, we may actively supplement the work of revival by a direction of the attention to the sub-conscious image; that is to say, *attention to partly developed images secures their full development.*

This furthering of the rise of an idea commonly has for its physiological concomitant, in addition to the muscular and other factors spoken of above, the innervation of the articulatory organ. As pointed out before, our ideas are, in the large majority of cases, called up in connexion with words. These words, moreover, have a marked muscular factor. To imagine a word is to have it "on our tongue," *i.e.*, to have the articulatory apparatus partially excited as in actually uttering it. Vivid attention to ideas appears to be aided by a strengthening of this muscular element.

This co-operation of attention in reproduction is nearly always

present in some degree. Even in comparatively passive processes of revival certain ideas attain to full distinctness rather than others because of the feeling of interest which they awaken. The sub-conscious representation is attended with a faint pulsation of feeling, and this feeling calls forth a reactive process, though it may be so rapid as to escape observation. This co-operation of interest or feeling is illustrated in recalling a series of past experiences, a beautiful poem, and so forth.

(*b*) **Control of Suggestive Forces.** In the second place, by holding certain presentative and representative elements before the mind and excluding others, *attention helps to determine the particular directions of revival.* Thus, by an effort of attention we may keep before us the several reviving factors in convergent suggestion, and so materially further the operation. On the other hand, we may, by the inhibitory action of attention, work against all divergent suggestion, or, as it has been called in this connexion, 'Obstructive Association,' and so exclude all irrelevant suggestions. In this way we can actively and voluntarily regulate the whole process of reproduction, and *secure the realisation of a particular result.*

All such regulation of the reproductive process obviously presupposes that we are able to recognise the right, that is, the required idea when it recurs. This is only a peculiar case of that recognition of an image as answering to a past experience which enters into all reproduction. What is peculiar to this case is that since other parts of the image group to which the required image belongs are already present, the recognition takes on the form of an awareness of fitness or of pertinence. Thus when I recall a long-sought name of a place or person I know it is the right name: first, because I recognise it as a familiar name; and, secondly, because I discern that it *belongs to* the object represented. It may be added that in thus seeking after images we have a previous vague knowledge of what we want and where (that is, in connexion with what other images) we are to look for it; so that when it emerges into clear consciousness we are able to say: 'That is what I was trying to think of'.

This controlling or selective action of attention is seen in all processes of reproduction that we are in the habit of calling recollections. Thus it takes place in the recalling of something

learnt by heart, as a poem. Here the will must steady the operation by an effort of attention, or, owing to the divergent suggestions of the several words, the mind will go off the track, and confuse one line or one verse with another in the same or in other poems.

Still more plainly is this regulative control seen in the common experience of 'trying to remember' something, as a person's name, a process well described by Aristotle by the metaphor of hunting for a forgotten fact (θήρευσις). Here we note a severer effort of concentration involving a more prolonged fixation of the reviving elements. The selective and the inhibitory (or exclusive) function become more conspicuous in this case, assuming the form of a seeking out and fixating all relevant ideas likely to aid in the process, such as the image of the person, that of some other name known to be like, or that of the initial sound of the name, and, on the other hand, of a resolute and rapid repression (by withdrawal of the attention) of all divergent or obstructive suggestion.

This control of the reproductive processes assumes a yet higher form in that lengthy and far reaching operation by which we overhaul, so to speak, the stores of memory in search of an idea or group of ideas of a particular kind or type. This is illustrated in such common experiences as trying to find a second case analogous to a present one, to recall some illustration of a principle, and so forth. It is carried to its highest perfection in the search of the poet for a simile, and of the scientific man for an illustrative idea. Such a ready command of images by voluntary attention presupposes that there has been previously an orderly arrangement of the psychical material, that when new acquisitions were made these were linked on (by contiguity and similarity) to old acquisitions. It is only when there has been the full co-operation of attention in this earlier or acquisitive stage that there will be a ready command of the materials so gained in the later stage of reproduction.

Perfect and Imperfect Recollection. Our ability at any given time to recall the impressions of the past varies indefinitely

from total inability up to the point at which all sense of effort vanishes and the reproduction is certain and instantaneous. At one extreme we have, apparently at least, total forgetfulness or obliviscence; at the other, perfect recollection; while, as an intermediate condition, we have partial, that is, temporary forgetfulness of greater or less persistence.

Our perfect recollections at any time embrace but a very few of our acquisitions. The conditions of such facile recall are too complex to allow of its realisation in the large majority of cases. A sufficiency of interest and of repetition, together with firm association with what is near at hand and so supplies a starting-point in the process of recovery, are all necessary to this result. What we can recollect instantly, and without conscious effort, is either included in, or firmly attached to, our permanent surroundings, dominant interests, and habitual pursuits. Thus we can at any time recall without effort the scenery of our home, or place of business, the sound of a friend's voice, the knowledge we habitually revert to and apply in our daily actions, our profession, and our amusements.

Next to this perfect recollection comes that which involves a greater effort, and is less uniform and certain. This applies to a good many of our acquisitions which have been firmly built up at the outset, but to which we have of late had little occasion to go back. Our knowledge of even the more striking events of the remote past, much of the book knowledge acquired at school and not turned to practical account in later life, as that of the classics, is an illustration of such imperfect recollection. These acquisitions cannot be recalled at once, but their revival requires a prolonged process of suggestion, in which a number of forces have to co-operate.

Forgetfulness. The failure of recollection leads on to the subject of forgetfulness or obliviscence. By this is meant the undoing of the acquisitive or retentive process. Forgetfulness implies as its correlative that an impression or group of impressions has been acquired and retained at least for a short time.

The forgetting or casting off of a large part of our temporary

acquisitions is a fact of great psychological importance. We appear to have the power by intense concentration for short periods of building up psycho-physical arrangements which afterwards, when the effort is relaxed, become disintegrated of themselves. The utility of this power is obvious. If we could not dismiss a "got-up" subject of examination, of professional interest, and so forth, when it is done with, our minds would be encumbered, and our brain-powers far more narrowly limited than they now are. Cramming, as has been pointed out by Jevons and others, has thus a value of its own, that is to say, *so far as the subjects to be temporarily 'got up' are useless for any subsequent purpose.*

Leaving such temporary retentions and coming to more permanent acquisitions, we find that forgetfulness manifests itself in close connexion with the processes of active reproduction considered above. Since we only know that an impression is retained by the fact or the possibility of its revival, and since the full effect of the forces of revival is only secured when we actively assist in the process, we naturally come to make recollection the test of retention. In other words, that is retained which we can recollect: that which we cannot recollect when we try to do so is regarded as forgotten or lost.

Forgetfulness, as thus understood, appears in two forms. Of these the first is the comparatively unimportant form of partial or temporary forgetfulness, and the second the more serious form of seemingly complete or permanent obliviscence.

Temporary forgetfulness is illustrated in the case of disused school-lore. We may still retain a part of this knowledge, only the recalling of it requires the co-operation of certain reinstating conditions, *e.g.*, in the case of a modern language, a day or two's sojourn in the country where this is spoken.

The stage of complete obliviscence is supposed to be reached when no effort of will, and no available aid from suggestive forces, succeed in effecting the reproduction. In order, however, to determine that a fact is thus irrecoverably forgotten, we ought first to have tried the maximum force of the reproductive

agencies, and this is often out of our power. The addition of the stimuli of locality, sound of voice, and so forth, might serve to recall images of persons which are now apparently irrecoverable. The remarkable revival of remote and seemingly lost impressions in dreams and in certain forms of brain-derangement suggest that much which we suppose to be forgotten might, *under the most favourable conjunction of conditions*, be recovered.

Memory and its Varieties. The foregoing account of the processes of reproduction will help us to understand what is popularly called the power or 'faculty' of memory. By this term is commonly meant the retention of a stock of acquisitions and the ability to recall these as they are wanted. In its higher form of a distinct recalling of presentations in their time-order (memory of events) it involves, as we have seen, a careful association of these with their temporal concomitants.

The reasons for marking off this department of psychical processes by a special name are obvious. As has been stated, retentiveness is an ultimate inexplicable psycho-physical function. And though, as has been pointed out, this function appears at all stages of development, and plays a considerable part in the so-called 'presentations' of sense, it only reaches its full expression in the processes of reproduction or representative imagination The great practical importance, moreover, of the power when thus developed sufficiently accounts for the fact of our distinguishing it by a particular name.

Memory and Memories. While thus employing the current term to mark off this sphere of reproductive imagination, we must not be misled into thinking that memory, even when thus limited, is a single faculty. The fact that memory has an organic base, and is, indeed, at once a physiological and a psychical phenomenon, is sufficiently shown in the known variations of reproductive power. Common observation tells us that the memory of one class of presentative elements, as tones, is one thing, that of another class, as colours, another. Speaking generally, and disregarding individual differences, we may say that the higher the sense in point of discriminative refinement

the better, *i.e.*, the more distinct and complete the corresponding process of reproduction. Thus of all presentations visual percepts are recalled the best; then come sounds, touches, tastes, and smells. Since, moreover, the muscular sense is characterised by a high degree of refinement, the retention of motor presentations, as seen in the recalling of articulatory movements, is in general relatively good.

The same independence of tone-memory, colour-memory, etc., is amply illustrated by individual differences of reproductive power. A boy may have an excellent (natural) memory for one particular class of sensations, say colours or articulate sounds, and yet fall below the average in respect of other impressions. This relative independence of retention for different groups of sensations has been still further shown by the facts of disease, which, by affecting particular regions of the brain, interferes with the reproduction of the correlated groups of impression. In like manner some people have a specially good memory for languages, for places, and so forth. Linnæus, the great botanist, though he could retain elaborate nomenclatures, is said to have been incapable of learning languages. These differences depend on two chief factors: (1) special sense-discrimination to start with, and (2) special interest and habits of attention leading to greater depth of impression and better association in the case of particular groups of presentations.

It follows from the above that the distinction commonly drawn between General and Special memory is not an absolute one. When we speak of a person having a good general memory we mean that *the general or average level of his various classes of retentions is high.* Such a good average retention has for its nervous correlative a high degree of structural perfection of the brain centres generally, whereas what is marked off as special memory, *e.g.*, for colours or forms, implies a special development of certain of these central structures. It may be added that general memory, as illustrated in the case of men like Scaliger, Pascal and Macaulay, turns largely on a high degree of *verbal* acquisitiveness.

Course of Development of Memory. The dependence

of conscious memory on its organic base is clearly seen in the rise and fall of the power of retention concomitantly with the growth and decay of the brain. A word or two on this parallel movement may well complete our account of the reproductive process.

We set out with the hypothesis that all psychical acquisition (other than momentary and evanescent retentions) involves the building up of new central arrangements, that is to say, the further differentiation of elements and weaving of connecting bonds. The first thing to note is that some time is required before the process of central evolution is carried sufficiently far for stable and lasting retention. As we all know, few persons retain in after-life any impressions of the events of the first three years. A possible explanation of this fact may be found in the circumstance that the nerve-centres have not as yet become sufficiently organised to supply a basis of permanent psychical integration. Impressions remain as yet detached, and are not taken up into that larger and more complex unity which we call our experience, or our history.

When this stage is reached we observe a rapid development of the retentive power. It is not uncommon to meet in autobiographies with minute recollections of events occurring in the fourth year. We see the same rapid growth of retentive power at this point in the facility with which most children from four onwards are able to memorise verbal material, verses of poetry, and the like. Judging by this criterion we may say with Dr. Bain that facility in storing up new associations reaches its maximum about the period from the twelfth to the fourteenth year. At this particular stage, then, we may suppose that the brain-substance is most plastic or modifiable, that new developments of central nervous structure take place most readily.

Later on, no doubt, the retentive power seems to continue unabated, and even to increase; but here the phenomenon is probably a different one. A man of twenty or even thirty will learn many things, *e.g.*, languages, better than the boy of fourteen, not because his brain is more plastic or disposed to take on new structural and functional modifications, but because the stock of

acquisitions already hoarded greatly diminishes the labour of further retention. That is to say, since he has a larger store of ideal nuclei, about which he can group, or to which he can assimilate fresh facts, his so-called new acquisitions contain less and less of the really new or unlearned. This economising of work in the acquisitive process, due to the diminution in the amount of new matter to be assimilated, is aided by certain habits to be touched on presently, which are the result of a careful methodical regulation of the memory.

The decline of memory, with the advance of years, illustrates the same close connexion with brain-power. Loss of cerebral vigour shows itself first of all in a failure of memory. More particularly the learning of new things grows difficult, so that the names of new acquaintances, and so forth, are not firmly held. On the other hand, as already pointed out, the superior tenacity of early years now reveals itself afresh in a revival of seemingly forgotten experiences of childhood and adolescence. Finally, in the gradual senile loss of memory we see traversed a similar course to that gone through in the case of the dissolution of memory by disease. Those retentions disappear first which have been acquired latest, which represent fewest repetitions, and so are least deeply organised in the brain-structures, *e.g.*, proper as contrasted with common nouns, while those disappear last which correspond to what was learnt first of all, has most frequently been made use of, and so become most deeply organised.

The Culture of the Memory. Much has been written respecting the improvement or culture of the memory. This has been due in part to an exaggerated idea of its intellectual importance. The power of 'carrying' is not necessarily the power of grasping or understanding. We know too that while many men of great intellect have been noted for their good memory, others, as Montaigne, have complained of the feebleness of their retentive power.[1] This branch of mental culture may be said to

[1] Hamilton gives a number of examples of men celebrated at once for their high intelligence and their capacious memory, *Lectures on Metaphysics*, ii. p. 224 ff.

aim at securing three constituents of a good memory, *viz.*: (1) readiness in acquisition as measured by the smallness of the number of repetitions necessary, (2) tenacity or permanence of retention as measured by the interval during which an impression has been retained, and (3) facility or promptness together with completeness or distinctness of reproduction.

The development of memory, both generally and in particular directions, is in every case limited by certain congenital organic conditions. The individual has an impassable limit set to his acquisitions in the primordial quality or degree of organisation of his central nerve structures. At the same time, exercise, attention, and the carrying out of certain methodical habits, greatly assist in those psycho-physical processes which we call the growth of memory. It is only when these factors are present that the full functional activity of the brain as a retentive organ is realised.

The foundation of all memory culture is careful observation. What we note closely we remember distinctly. The exercises that enter into memory culture, *e.g.*, learning by heart, obviously include a patient prolonged concentration on the material to be learnt. The closer the concentration, and the more persistent the repetition, the more firmly will the several features of the material be fixed in the mind.

Next to concentration and methodical repetition comes the work of orderly connexion or arrangement. By this is meant a careful consideration of the facts to be learnt in their relations one to another, and also in their relations to previously known facts. Such arrangement when properly carried out involves much judgment or judicious selection. The art of learning readily and lastingly turns not a little on skill in discriminating the important from the unimportant, in selecting central or main points about which to group subordinate matter. To discern where to concentrate, and what to overlook, so as not to burden the mind with useless lumber, is one important secret of a good memory.

Art of Mnemonics. In connexion with the improvement of the memory, reference may be made to those systems by which

it has been hoped to reduce memory-work to an affair of simple rule. Such systems, variously known as artificial memory, systems of mnemonics and *memoria technica*, have as their special object to facilitate the acquisition of verbal and similar matter, such as historical dates.[1]

It follows from what has just been said that the improvement of the memory, so far as this is possible, must proceed by a careful regulation of the acquisitive, and, as supplementary to this, of the reproductive, process, through concentration of the attention. This concentration effects its object by means of the psychophysical process of association and suggestion already explained. More particularly it proceeds by introducing an orderly arrangement of facts or details, so that each becomes firmly conjoined with other and related facts, and more particularly with facts lying nearer to us as recurrent elements of our sense experience, and as matters of strong personal interest, and consequently fitted to be efficient suggestors.

The ancient and modern systems of mnemonics aim at forming artificial connexions between different portions of the matter to be learnt. Thus, in the systems of the Roman rhetoricians, the various heads of the discourse to be learned by their pupils were to be associated quite arbitrarily with the several local divisions of a building, and so forth. So, in modern systems, the remembering of lists of irregular verbs, of particular series of digits in historical dates, etc., is facilitated by binding together the several constituents, as in giving a metrical form to the words and so calling in the aid of similarity of sound and the interest of rhythm, or in fancifully investing a disconnected series of numbers or letters with the semblance of regularity and connexion. All such devices owe their value to the principles of association and suggestion expounded above, and there is little doubt that they serve a very useful subordinate purpose in the processes of learning.

[1] It is customary to distinguish three modes or methods of exercising the memory. (1) The *mechanical method* by attention and repetition, (2) the *judicious method* by due selection and arrangement, and (3) the *ingenious method* by the artifices of technical memory.

At the same time, owing to the great diversities among individuals, in respect not only of the classes of sensation best recalled, but also of the modes of suggestion that prove most serviceable, these rules cannot be said to have more than a relative and limited validity.

These individual differences become important in considering the value of that scheme of topical or geometrical memory which is illustrated in the systems of Roman mnemonics already referred to. Whether a speaker would derive any aid from connecting his verbal material with the several local divisions of a visual scheme, such as the parts of a building, depends much on the strength of the visual or pictorial memory, and also on the readiness with which sounds enter into (heterogeneous) association with visualised forms. That they do so in the case of many individuals is proved, among other ways, by the curious inquiries of Mr. F. Galton into the way in which people represent (or visualise) numbers. He found that a considerable number of persons have habitually, from early childhood, pictured the numerals one, two, three, etc., in a kind of simple geometrical arrangement, *e.g.*, as lying in a circle, or along a line changing its direction at certain points.

REFERENCES FOR READING.

A very full and detailed account of the workings of contiguous association is given by Dr. Bain under the head, Law of Contiguity, *The Senses and the Intellect*, "Intellect," chap. i.; and W. James, *Principles of Psychology*, vol. i. chap. xvi. Dr. Ward develops a somewhat original theory of reproduction in his article "Psychology" (*Enc. Brit.*). On the means of improving the memory the student may consult Dugald Stewart's *Philosophy of the Human Mind*, part i. ch. vi. With this may be compared Sir W. Hamilton's account of memory, *Lectures on Metaphysics*, especially lectures xxxi. and xxxii.

CHAPTER IX.

PRODUCTIVE IMAGINATION.

Reproductive and Productive Imagination. Reproduction involves, as we have seen, the picturing of objects and events in what are called representative images, and is thus a form of imagination. In these reproductive processes, however, the images are supposed to be mere copies of past impressions. In reproductive imagination we retrace the actual forms and order of our presentative or sense experience. But what is commonly known as imagination implies more than this. When we imagine an unrealised event of the future, or a place which is described to us, we are going beyond our actual experience. The images of memory are being in some way modified, transformed, and recombined. Hence this process is marked off as Productive or as Constructive Imagination. It is this productive process which is specially referred to by the term Imagination.

While, however, we thus mark off (productive) imagination as a stage of psychological elaboration going beyond reproduction, it is easily seen that no hard and fast line of separation can be drawn between the two. The reproductive process in its complete form, the dating a past experience, involves, as we saw, a somewhat elaborate mode of construction in the time scheme employed. Not only so, it is to be noted that what we call remembering or recollecting is by no means an exact transcription of the actual facts of presentation. The record of memory is being continually falsified by the effects of time, the loss of certain constituents of the experience, and the confusion of experiences one with another. And to this may be added that, in recalling past experiences, we tend, without any clear intention, to omit and even to rearrange so as to suit new circumstances, or

gratify a new interest. Thus, in various ways, the reproductive process is adulterated by an admixture of sub-conscious production.[1]

Nature of Production. It is evident that imagination as thus understood stands in a close relation to the processes of presentation and reproductive imagination. That imagination has to do in a special way with the things of sense was recognised by ancient philosophy. Whenever we picture a place, a scene, an event we read or hear of, we are engaged with sensible experience, the impressions of sight, hearing, and so forth. Such picturing is obviously effected by means of a reproduction of past sensations. To imagine 'darkest Africa,' and even the Heaven of Milton or Goethe, is to make use of our past sense-experiences.[2]

Not only so, the modes of connexion of our experience necessarily reflect themselves in all our imaginative picturings. Thus it is obvious that all production makes use of those forms of combination which seem inseparable from our experience, *viz.*, the order of space and of time. Whenever we imagine, even in the wildest dreams of sleep, though we may be confusing particular positions or dates, we are still grouping objects in space and ordering events in time. Other illustrations of this reflexion of the connexions of our actual sense-experience are seen in our habitual picturing of things as concrete wholes resembling those we know through our senses, of the movements of objects as continuous from one point of space to another, and so forth.

It follows that what we mean by productive imagination consists merely in *carrying out certain changes or modifications in that reflexion of our sense-experience which is supplied by the reproductive process.* Such changes must in general consist of two kinds: (1) a process of separation or subtraction, and (2) a process of combination or addition. The former is illustrated in all picturing

[1] I have given a full description of these processes in my volume, *Illusions*, chap. x. ("Illusions of Memory").

[2] In addition to such sensuous imagination, there is the imagination of inner mental states, and more particularly feelings, a process that plays a large part in sympathy. But this direction of imagination may be disregarded for the present.

of objects away from their habitual surroundings, *e.g.*, a house on a new site; of isolated parts, features, or qualities of an object, as the head of a decapitated man, the colour of the orange or the gentian apart from its form; and of objects robbed of certain of their features or diminished in their size, as the one-eyed Cyclops, the diminutive Puck, and so forth. The latter process is seen in the imagination of objects with new features or in new circumstances, as in the stock instances, the mountain of gold, the centaur, the mermaid, and the like.

The processes of imaginative production now to be considered are carried out in relation to all kinds of sense presentation. Thus, in the domain of hearing, musical tones and articulate sounds are susceptible of endless separation and recombination. So, in the region of muscular experience or motor presentation, we may occupy ourselves with taking apart customary complexes, and forming new combinations, as in picturing the motion of flying, and so forth. Since, however, visual presentations constitute the most important class, presenting, moreover, the double complexity of a local juxtaposition of parts, and a combination of the heterogeneous and easily separable elements of colour and form, the imaginative process as commonly understood is specially concerned with unmaking and remaking visual or pictorial representations.[1]

Such imaginative manipulation of the material of sense experience plays a large part in mental development. It is very far from being, as sometimes supposed, a mere pastime of the mind, but enters, as we shall presently see, as an integral factor into the development of intelligence.

Limits to Imagination. It follows from this brief account of the productive process that all imaginative activity is limited by experience. To begin with, then, since production is merely an elaboration of presentative material, there can be no such thing as a perfectly new creation. The greatest imaginative genius would strive in vain to picture a wholly new colour.

[1] This is clearly recognised in current modes of speech, as when we talk of the eye of imagination, its far-sightedness, and so forth.

But, again, the processes of separation and combination are themselves conditioned and limited. When two things have always been conjoined in our experience it is impossible to picture them apart. Thus, though we may imaginatively vary the colour of an object at pleasure, we cannot picture it as having no colour at all. Not only so, it may be said that the more uniformly two things are conjoined, the more difficult it becomes to dissociate them. Thus it is much easier to picture a moving object, as a man, apart from a definite set of local surroundings, than a stationary one, as a church. On the other hand, the mind finds it difficult to combine images as new wholes when experience suggests that the elements to be combined are incompatible. The Oriental king could not picture solid water or ice. We all find it hard to imagine persons on the other side of the globe with their feet towards ours, and yet not falling downwards

Passive and Active Imagination. It is customary to distinguish between a passive and an active process of imagination according as the changes just described are carried out unconsciously, or at least without any effort of voluntary attention, or involve this active factor. A word or two will serve to illustrate the distinction.

Passive imagination is that part of the unmaking and remaking which is done for us by the so-called spontaneous or mechanical workings of our psycho physical organism. As already remarked, the images of memory tend to become transformed by a passive, unconscious, or automatic process. Thus the very imperfections of the retentive power lead to a partial or fragmentary reinstatement of percepts, and so bring about a certain amount of separation of presentative material. Thus we often recall a face without the figure, a pair of eyes apart from the face, and so forth. Again, the automatic processes of revival would introduce a certain amount of *recombination* of presentative elements. If a common element A occurs in the different combinations CAB, MAP, and so forth, the common presence of A may beget new combinations among these adjuncts, *e.g.*, MC or PB. Thus in recalling two *rôles* of one and the same actor we are apt to find ourselves

picturing a patchwork of two figures, as the cloaked form of Hamlet and the wind-driven locks of Lear. That similarity does thus effect a certain regrouping of presentative complexes is clearly illustrated in many of the confused images of our dreams.

This action of similarity is aided by the effect of a plurality of suggestive stimuli, and the workings of divergent suggestion. At a given moment a number of external impressions and organic sensations may occur together for the first time, each tending to recall a separate group of images. By such partial contemporaneous revivals of disconnected elements new juxtapositions and groupings arise. This process is clearly illustrated in the grotesque combinations that arise quite spontaneously in the childish mind before the habit of inhibiting these as useless has been formed

While, however, much production takes place in this unconscious or sub-conscious manner, the higher and more valuable forms of it involve an active regulative factor. Here, as in the case of active reproduction, we have the work of voluntary attention, the aiding of certain tendencies, and the counteracting of others, in order to reach a particular desired result. It is only when the productive process is thus controlled and guided by the will that it becomes in the full sense what we mean by construction, *i.e.*, an orderly, methodical bringing together and arranging of parts in a new organic whole.

The Process of Construction. In tracing out this process of construction we must note (1) to begin with that, like all elaboration, it requires as its condition the presence of certain materials. All that the most careful direction of the attention can effect is certain modifications in the spontaneous or automatic flow of images.

These materials are supplied ultimately, as we have seen, by our sense-presentations. The retention and reproduction of percepts is presupposed in all imaginative production. There is no production without reproduction. In trying to realise a scene described by a traveller or a poet I am wholly dependent on the revival of past experiences of my own. Such reproduc-

tion will take place by way both of contiguous suggestion and assimilative revival. It is only when these revivals take place readily that the constructive process can advance. Hence the frequently observed fact of the vividness, rapidity, and range of reproductive ideation in the case of men of great imagination.

(2) Again, active production is aided by the automatic regrouping of elements just described. Active and passive imagination are not wholly distinct, but the former includes the latter. Much of the highest imaginative work of the poet is due to the action of those sub conscious forces which are ever at work bringing about novel combinations of imaginative elements. The initial idea is in most, if not all, cases of such active imagination the outcome of this automatic action.

(3) The conscious elaboration consists in keeping the first draft-image fixed in the mind, and improving on it and developing it by the aid of such further image-material as is suggested by the special circumstances of the time. As in the case of active reproduction, the function of voluntary attention is here limited to developing and fixing or retaining certain elements, and rejecting others. Thus, in trying to imagine a new experience, say a day in a country house, a child starts with a crude idea of what it is like, based on a revival of previous analogous experiences. Keeping this idea steadily before his mind, he recalls in close connexion with it, and by the aid now of assimilative revival, now of contiguous suggestion, a number of other experiences. The selective action of voluntary attention here comes in, rejecting what is recognised as unfitting and incongruous, and furthering the reinstatement of what is seen to be suitable. In this way a more elaborate image-structure gradually arises by a process of organic accretion or growth, the whole being controlled by what we call a volitional activity.

It is evident from our brief analysis of the constructive process that its due regulation depends upon a clear sense or judgment of what is fitting for the purpose in hand. It is, indeed, the degree of fineness of this guiding sense which principally determines the success of the whole operation. According as a poet, for example,

has a clear and discriminating, or a dull and obtuse, sense of what is æsthetically valuable, congruous, or harmonious, so will his constructive work be well or ill performed.

The result aimed at, and the corresponding guiding sense of fitness, will differ in different cases. In reading a book of travels, for example, we seek to frame clear mental pictures which fit in with the rest of the series; and we know when we have hit on the right combination of images in this case by a consciousness of the consistency of the grouping and of its agreement with the facts of our experience, in other words, by a feeling of satisfaction which comes of *understanding* what we read. On the other hand, in combining movements in order to bring about a wished for practical end, we are guided by an instinctive sense of what is feasible, and what will conduce to the desired end.

Receptive and Creative Imagination. The constructive process just described assumes a variety of forms according to the special circumstances, the materials dealt with, and so forth. One such variation presents itself in the difference between the externally determined or receptive form of the process, and the independent or creative form. The former is illustrated in the realisation of another's ideal grouping through the medium of language. Thus in reading a poem and forming a mental picture of the scenes and incidents described the mind of the reader, though called upon to construct, has the order of construction pre-determined for him by the particular arrangement of the poet's words and sentences. Such receptive imagination is, as we all know, a comparatively simple operation. The imagination of the poet, on the other hand which first created the combination, had no such lines laid down for its activity. The act of construction in this case is of a higher order, involving more complex processes of reproduction, rejection, and selection, and directed solely by an internal sense of what is beautiful or harmonious. Hence such original or creative imagination is rare, and is always taken as a mark of extraordinary mental power.

Various Directions of Construction. The process of

productively combining images follows more than one direction, being the essential mode of activity in a variety of mental operations. The more important of these may be grouped under three heads: (1) Construction as subserving knowledge about things, Intellective Imagination; (2) Construction as aiding in the carrying out of actions or practical operations, Practical Construction, and (3) Construction as subserving feeling, the satisfaction of the emotions, of which the principal form may be called Æsthetic Construction

(*a*) **Intellective Imagination.** It must be evident that the expansion of knowledge beyond the bounds of personal experience and observation involves a process of imaginative production. This is seen alike in the *acquisition* of new knowledge from others through the medium of language, and also in the independent *discovery* of new facts by imaginatively forecasting what will be observed, or might be observed. The first illustrates the receptive, the second the creative kind of imaginative activity.

The process of recalling, selecting, and regrouping the traces of personal experience is illustrated in ordinary verbal acquisition. What is commonly called 'learning,' whether by oral communication or by books, is not simply an exercise of memory; it involves an exercise of the imagination as well. In order that the meaning of the words heard or read may be realised, it is necessary to frame clear and distinct pictures of the objects described or the events narrated. Thus, in following a description of a desert, the child begins with familiar experiences called up by the words 'plain,' 'sand,' and so on. By modifying the images thus reproduced by memory he gradually builds up the required new image.

The success of the operation will turn on the recalling of the appropriate image elements, and only these. The suggestive forces, when uncontrolled, tend to bring up what is not wanted. Thus, in imagining the desert by help of the sand, the child may be led by contiguous association to recall the cliffs and the sea. Accurate knowledge-bringing construction involves a careful pro-

cess of *discrimination* of the new object, scene, or action from its prototype in previous experience, as supplementary to the assimilative process.

On the success of this imaginative effort what is known as the *understanding* of verbal description will depend. If, for example, in following a description of an iceberg, a boy pictures a mass of ice, but does not distinctly represent its magnitude, he will not understand the dangers arising to ships from those floating masses. Here we see the close relation between clear imagination and clear thinking, a relation to be spoken of again by-and-by.

The activity of imagination enters not only into the acquisition of knowledge about concrete things and events not directly observable by us, as far-off countries and races of men, and the events of history, but also into the assimilation of scientific knowledge. Science, it is true, has to do with the general, and so makes her largest appeal to other intellectual activity than that of imagination, which deals with the concrete and sensible. At the same time, before the mind can seize the general, it must have clear images of concrete examples. These must of course be based as far as possible on direct perception, or observation through the senses; but this cannot always be done. Thus, for example, the movements of the planets, the circulation of the blood, are things which we are called on to a large extent to imagine constructively by the aid of analogies to previous objects of perception. Even those sub-sensible material elements and processes of which modern physical science tells us so much, as the vibrations of light and heat, the conjunctions and disjunctions of atoms and molecules in chemical changes, have in a way to be pictured by the mind, and so the understanding of these impalpable entities may be said in a measure to exercise the imagination.

The kind of imaginative work here referred to, so far from being easy, is exceedingly difficult. It must be remembered that language is in its nature general and abstract. Words (other than proper names at least) tend to call up not a definite image of one particular object, but a general idea of a class or common quality.

Hence all verbal description of individual scenes, persons, and so forth, has to proceed by a gradual process of *individualisation.* That is to say, the general name has to be supplemented by a number of qualifying terms, each of which helps to mark off the individual thing better. Thus the historian depicts a particular king or statesman by progressively enumerating his several physical and mental qualities, the *savant* describes an animal or a plant by giving the more important characters. It follows that the process of realising the description turns on the proper *combination* of several general or 'abstract' ideas into the image of a concrete object. This process has been named 'concreting the abstract'.

The discovery of new knowledge is largely a matter of careful observation and patient reasoning from ascertained facts and truths. Yet what has been called the "scientific imagination" materially assists in the process. The inquiring, searching mind is always passing beyond the limits of the known, and seeking to grasp the unknown by processes of imaginative conjecture which cannot be reduced to the form of conscious reasoning. The power of thus divining unobserved facts is commonly spoken of as *imaginative insight into things.* The child shows the rude germ of this capability when picturing to himself the make of his toys, or the way in which plants nourish themselves and grow.

Not only does imagination thus reach out in anticipation of unobserved facts, it is busy devising suppositions (or hypotheses) for the explanation of them. A scientific hypothesis, though, when fully developed, it assumes the form of a general truth, is reached by the help of a process of constructive imagination. That is to say, the mind of the scientific discoverer seeks to realise the action of the forces at work by imaginatively picturing their action in a concrete case, such imagination being carried out by help of facts gained from past observation. Thus the invisible undulatory movements of sound and light were at first 'visualised' by the help of certain sensible undulations, as, for example, those of the sea.

(*b*) **Practical Construction: Contrivance.** Again, the process of construction enters into our every-day practical acquisi-

tions, such as various forms of manipulation, the co-ordinations of the movements of the limbs in new groupings, as in learning to swim, skate, and so forth. A child advances in the command of his limbs, putting them to ever new uses, by modifying already acquired movements, that is to say, breaking up old combinations, and regrouping them in new arrangements. As we shall see more fully by-and-by when we come to trace the progress of this active development more in detail, much of this practical acquisition is suggested by the actions of others. The impulse of imitation leads a child to copy the speech and actions of his parents and companions. Such imitative construction of new motor groupings, being directed by the presentation of another's movements, may be marked off as the *receptive* side of the practical imagination.

While much new practical acquirement may thus be attained by imitation and instruction, it is also gained by individual origination, or what we call contrivance. Thus, as we all know, children work out many new combinations of movement for themselves. Their active impulses find a satisfaction in manual and other experiments. Such activity is, moreover, greatly sustained by the impulse of curiosity, the desire to find out about the make of things, their origin, and so forth. In this way, practical construction, under the form of experiment, greatly assists in the discovery of facts.

More complex examples of this practical construction are seen in all ingenious mechanical inventions, such as the spinning jenny, the steam-engine, and the like. It is this higher plane of construction to which we commonly refer when speaking of original practical invention. Here it is evident there enters in much previous knowledge of related mechanical processes, and a specially fine tact or judgment with respect to the adaptation of this and that agency, or group of agencies, to the particular practical result desired.

In all forms of practical contrivance the general conditions of successful construction hold good. A sufficient store of material, that is to say, a wide and varied experience, fitted to supply con

stituent elements for the new process, is presupposed. Next to this comes skill in breaking up and rearranging this material in new forms under a clear practical sense of fitness or adaptability to an end. These qualifications must, it is evident, be supported by a strong interest in the result, and a steady volition or resolution.

(*c*) **Æsthetic Imagination.** There remains the process of construction as it takes place in connexion with states of feeling of marked intensity. The full understanding of the influence of the feelings on the intellectual processes must be postponed till we come to discuss the former: here it may suffice to indicate briefly the modifications of the form of the constructive process which occur under the influence of the more palpable states of feeling.

The connexion between feeling and imagination is recognised by all. Indeed, when we think of imagination, we naturally conceive of it as impelled and sustained by feeling. We are all most imaginative when we feel most. The activity of imagination in the Fine Arts, which have as their special function the gratification of the feelings, illustrates this connexion in a particularly clear manner.

The two main distinctions of such feeling-prompted imagination are the special vividness of the imaginative realisation, and the particular direction of the selective process. Feeling as a form of excitement tends to give exceptional vividness, distinctness, and persistence to the images called up at the time, as is plainly illustrated in the fact that states of preternatural emotional excitement, as terror, are apt to induce an *illusion*, *i.e.*, a mode of imagination which simulates the vividness and other marks of the sense-presentation.

In the second place, the presence of a feeling gives a particular direction to the imaginative process. As we shall see more fully by-and-by, *every feeling tends to reinstate those particular images which are through association accompanied by a tone of the same or a kindred feeling, and consequently serve to intensify and prolong the initial feeling.* Thus in a state of joy we are disposed to entertain pleasant ideas rather than any others;

in a state of grief, sad or unpleasant ideas; in a state of fondness, ideas of the beloved one's good qualities, future achievements, and so forth.

The range of this feeling prompted imagination is much larger than is commonly supposed. There is a form of it that enters into all *quasi* poetic contemplation of natural objects. We expand our life of feeling by imaginatively realising the objects that surround us, as when we imaginatively *feel* the delicious coolness of the summer stream, or the perfect pliancy of the waving grass. Not only so, with that impulse to give life to things that is born with us and never leaves us, we imaginatively or [illegible] project our own feeling into the world of objects. Thus, as is well pointed out by Lotze, we extend by a kind of poetic fiction our feeling of strength, of agility, of personal dignity, to our walking stick, our dress, and the like, incorporating these, so to speak, into our sentient organism. Similarly we discern in the changing aspects of nature, its sunshine and its gloom, its storminess and its repose, reflexions of our own varying emotional states.

The constructive efforts of the poet are but a higher development of the same processes. He builds up his beauteous world, where nature is surpassingly lovely, human action preternaturally noble, and so forth, through this selective action of feeling. It is the æsthetic feeling, the love of the beautiful, the sense of harmony, which here inspires the whole process of image formation. In the poet's mind [illegible] form themselves with scarcely any volitional control, through the instinctive feeling for a beautiful result which at once seizes and retains any conjunctions that have the appropriate æsthetic charm.

It follows from this that æsthetic imagination is essentially an *idealising* process. By selectively bringing together only that which answers to a particular feeling, it effects a mode of integration which stands in marked contrast to the associative groupings of our real experience. It is essentially a harmonising of facts in conformity with the needs of feeling.[1]

[1] This properly emotive control of the imaginative process is well illustrated in our dreams. (See my volume, *Illusions*, chap. vii. p. 1[illegible] etc.)

Relation of Imagination to Intellect. In these processes of feeling-prompted imagination the limits of truth and probability are apt to be lost sight of. The impelling and sustaining feeling alone determines the direction of the constructive activity. And, as has been just shown, this tends to take us far from the modest confines of fact. The vast domain of golden and intoxicating hope, of poetic romance, attests sufficiently this tendency of imagination to transcend the region of sober reality.

Such free indulgence in the pleasures of imagination has, it is evident, a bearing on the question of its intellectual value. We saw above that the imaginative process when carried out under certain conditions, *viz.*, the desire for knowledge and a sense of what is consistent and probable, is an integral part of the operations of intellection itself. And we have now seen that when swayed by feeling and so divorced from the sense of truth and probability it leads in directions away from reality. Now, this might not matter if such indulgence had no relation to belief. But, as we all know, the formation of vivid ideas and the dwelling on these involve the danger of regarding them as representative of reality. Imagination, as we shall see more fully by-and-by, directly fosters belief. We all tend to accept as true, for the moment at least, our visions of the future, and the delightful stories of romance. And thus we find in imagination, as commonly understood, a force at work that is antagonistic to intellect, and the logical end of truth.

It must be confessed that writers on the imagination, here following common opinion, have been wont to dilate on the intellectual dangers of imagination rather than on its uses. By confining their attention to the vagaries of imagination under the stimulus of strong feeling they have lost sight of its properly intellectual function. This oversight is clearly illustrated in the old opposition of imagination and understanding. This view overlooks the fact that, when duly controlled, imaginative activity not only leads on to the grasp of new concrete fact, but even prepares the way for the higher processes of thinking. By giving mobility and flexibility to the images of memory it is an essential pre-

liminary to that activity of thought which we shall consider presently.

Course of Development of Imagination. The activity of imagination follows a well-marked course during the life of the individual and appears to have had a similar development in the life of the race. And it may be worth while, as in the case of memory, to briefly indicate the stages of this development.

Production being dependent on reproduction, the imaginative process does not begin to appear till the reproductive process attains a certain strength. It follows, moreover, from the large *rôle* assumed by language in new ideal formations, as in the reproduction of presentations, that the imaginative process only reaches a considerable development after a certain command of the plastic verbal material has been acquired. The child begins to show readiness and boldness in the weaving of new fanciful combinations when it becomes skilful in the manipulation of words, and, through the medium of such word-rearrangement, is able to effect a regrouping of its visual and other images. It has been pointed out by a good observer in the domain of infant psychology that a child will not display an interest in stories until he has had some practice in following a verbal narration of his own past experiences. And it is presumable that the imaginative efforts of the race in the lower stages of culture grew in like manner out of ideal rehearsals of past experience, and in close connexion with the manipulation of language.

When these conditions are satisfied we find that imagination becomes rapidly a leading type of activity in the case both of the individual and of the race. The ignorance of the real world and its laws leaves the child and the uncultured man with a vast domain of the unknown which they are free to fill up with the products of their fancy; and a number of impulses, including a crude undisciplined curiosity itself, leads the uninformed mind to people this large *terra incognita* with forms of its own invention. Hence the rich efflorescence of fancy in the child who, from the age of three or four onwards, is wont to fashion an invisible world of his own, into which he retires in dream-like seclusion as the

impulse takes him. Hence the quaint amusing fancies by the help of which he ekes out his sparse knowledge of the material world and human life, grasping and explaining what he sees or hears about in his inimitable childish fashion. Hence, too, the naive spontaneity and vigour of the imagination of primitive peoples, as attested in the systems of folk-lore and mythology that have come down to us.

The prodigality of this early fancy is strikingly illustrated in the play of young children. Play may be considered from more than one psychological point of view. Thus, looked at one way, it is the region of primitive spontaneous action, the natural vent of the child's active impulses, its inclination to do things, and to find out new ways of doing them. Viewed on another side, it illustrates the imitative or mimetic impulse of children, for play is largely a mimicry of the actions of adults. This mimicry is, however, plainly a make-believe. The child does not seriously follow out the actions of father, nurse, and so forth, when it plays with its hobby-horse or with its doll. All play is thus fanciful. When at play the child realises by an exercise of fancy the scene and action which he is mimicking. The actual presentations, the doll, the wooden bricks, and so forth, do, indeed, supply a certain basis of sense-reality; and this is of great assistance to the young imagination in attaining to a half-illusory realisation of its images. At the same time, the basis is commonly slender enough. It is only when what has been called "the alchemy of imagination" begins its work that the battered and broken doll becomes in a manner transformed into a living child, and the rude stick into a living, prancing horse. Hence a boy will often derive as much pleasure from a broken and shapeless hobby-horse as from the most ingenious of mechanical toys. Play thus illustrates in a striking manner the liveliness and range of children's fancy.

As we all know, the progress of experience and the growth of knowledge lead, in the case of the child and of the race alike, to a moderation of this prolific primitive imagination. From the first spontaneous form in which it is free to follow every capricious impulse, it passes into the more regulated form in which it is con-

trolled by knowledge, and the sense of probability. The development of the higher forms of intellection, though carried out upon the results of careful observation, tends to check this lavish profusion of infantile fancy. The child and the race no longer account for rain, snow, and wind by help of mythical personages, personifications of nature's forces, but by what we call her laws. Expectation learns to move along the lines of probability. And the same progress of knowledge and of the logical faculty influences the ideas of art. The child's nursery stories, "Jack the Giant Killer" and the rest, cease to please, because they are now seen in their flagrant and absurd impossibility.

Nevertheless, although the accumulation of experiences and the development of higher intellectual powers thus tend to restrict the wild play of childish fancy, they by no means arrest or even impede the movements of imagination. It is a mistake to suppose that imagination no longer thrives when these primitive activities become circumscribed. What we dignify by the name of the boldness, the energy of childish imagination, is in truth merely the result of the absence of knowledge. Moreover, these combinations are very easy ones from the child's point of view, being simple in structure and modelled on the pattern of familiar every-day facts. It is to be noted that the child or the savage who is able to weave some picturesque myth could not form a clear mental picture of an animal that was described to him. Imagination passes out of this sportive childish form into a disciplined methodical one in which it becomes capable of more and more complex and difficult operations. In this way it helps, on the one hand, to extend the range of our knowledge, by assisting in the realisation and understanding of all that others tell us, that is to say, of by far the larger part of what the educated know, and, on the other hand, to widen and vary the region of æsthetic enjoyment, by enabling us to transport ourselves more easily and therefore more enjoyably into the wide and well filled world of modern poetry.

The Culture of the Imagination. The general conditions of mental development apply to the growth and improvement of

the imaginative process just examined, and this circumstance enables us to lay down certain practical rules for its methodical culture.

The exercise of imagination must of course have its basis laid in that of observation and reproduction. The poet and the artist observe finely, and retain their observations in a vivid and distinct form. A man may, however, be finely observant, and retentive of what he observes, and yet comparatively incapable of elaborating the material so gained into new forms. The contrast frequently drawn between the observant and the imaginative child, and the logical and the poetic mind, sufficiently illustrates this truth. To follow readily and with pleasure the descriptive words of a writer is in itself an art. There are many boys and girls who receive what is called a good education but never acquire the art of facile and refreshing reading, just because they have not had a sufficiently wide and careful training of the imagination All this shows that special exercise in the productive process itself is needed

This special training in productive reading is carried out to some extent by ordinary intellectual studies; more especially subjects like travels, descriptive geography, history, are an acknowledged means of attaining vividness and distinction of imagination. The study of the "humanities" has been upheld on the ground that it cultivates imaginative insight into others' thoughts and mental experience generally..

Owing, however, to the severe demands now made on the logical faculty, and the habit it induces of regarding things as generalities and abstractions, the imagination can only maintain a vigorous activity by means of that wider culture which embraces poetry and art It is, as we have seen, under the vivifying touch of poetic or æsthetic feeling that the imaginative process attains its full strength. The study of poetry and imaginative literature as a whole is thus the great instrument for developing the imagination. Such study helps us to preserve some of the mobility and some of the vivacity of primitive fancy itself.

REFERENCES FOR READING.

The accounts of the process of imagination given by Dugald Stewart and Sir W. Hamilton are slight and unsatisfactory. Professor Bain deals more fully with the subject in his own manner under the head of 'Constructive Association,' *Compendium* (Psychology), bk. ii. chap. iv. *Cf.* Höffding, *Outlines of Psychology*, v. b. 12.

CHAPTER X.

PROCESSES OF THOUGHT. CONCEPTION.

General Nature of Thinking. The intellectual operations hitherto considered have had to do with the concrete, that is to say, the presentations of the senses, and the representations formed on the model of these. To perceive, to remember, and to imagine have reference to some particular object, as the river Thames, or a particular occurrence, as the coronation of the German Emperor in 1871, in its concrete fulness as it presents itself or would present itself to our senses. But we may reflect on some one attribute of these, as the movement, or the width of the river, or the splendour of this particular ceremony; and we may reason about rivers or ceremonies in general. When we do thus separate out for special consideration particular attributes or aspects of concrete things, and consider things in their relation to other things, and so deal with them as generalities, we are said to *think*.[1]

These processes of thought constitute the highest stage of intellectual elaboration (intellection). By taking our concrete percepts and resolving them into so many abstractions (qualities or attributes of things, relations between things) we are enabled to carry up the process of cognition to the last stage of unification. As long as we view a particular object, or an event, alone, apart from other things, we merely *apprehend* it. But when we bring it into relation to kindred things we *comprehend* it. Thus

[1] Here again we have a word used in psychology in a sense somewhat different from its every-day one. We often say we cannot 'think' of a thing when we mean we cannot recall it, or cannot imagine it.

we comprehend the tiger by classing it with other members of the feline group. So we comprehend or understand the movement of the steam-engine by assimilating it to the more familiar action of the steam in the kettle in forcing up the lid. To think is thus to understand, and the two expressions Thought and Understanding are sometimes used (as by Locke) as synonymous.

Like imaginative production, thinking is nothing but the sum of processes of separation and combination carried out on sense-material. But in this case the elaborative processes assume a new and peculiar form. It is one thing to build up a pictorial image as the poet does, another thing to elaborate an abstract idea, such as the scientific notion of force, fulcrum, and so forth. We must now try to investigate more thoroughly the nature of this thought elaboration.

Thought as Activity. It is evident that the processes here roughly described are active processes, that is to say, that they involve a special exertion of the forces of attention. In perception, reproduction, and constructive imagination we have already found this active factor at work. But it is only in thought proper that this activity becomes fully developed. To single out analytically and think specially about a particular attribute in an object, say the colour of a rose, is, as we all know, more or less of a conscious effort or strain. A child first called upon to think about an abstract quality, or a relation between different objects, finds the operation difficult and fatiguing. All thinking is, in truth, an exercise of the higher form of attention, *viz.*, *volitional* concentration of consciousness. We only think when we have some purpose, as the discovery of the likeness or difference among objects. And such a purpose only develops itself as the individual and the race attain a certain measure of development or culture.

This activity of thought has, as already suggested, its cerebral conditions. The processes of thought presuppose the development of the highest and most complex arrangements in the cortical centres of the brain.

Directions of Thought-Activity. This thought-activity

may be viewed as having two aspects, or as following two directions, which it may be well to consider apart, even though, as we shall presently see, they are inseparable aspects of one process. Just as we saw that all intellectual elaboration is at once differentiation or separation and integration or combination of what is differentiated, so we shall find that thought itself is but a higher development of each phase.

(*a*) **Analysis: Abstraction.** First of all, then, thought may be viewed as a carrying further and to higher forms the process of differentiation or separation of presentative elements by means of isolating acts of attention Thus in considering selectively the colour of a rose, or the form of a crystal, we are, it is evident, differentiating what is given in perception as a complex into a number of parts, and rendering one of these specially prominent and distinct. Such thought-separation is commonly spoken of as Analysis, *i.e.*, the taking apart of what is conjoined in a whole, and also as Abstraction or the withdrawal of attention from those parts of the presented material which are for the moment irrelevant, and confining it to one particular point, feature or quality (Latin, *ab* or *abs* and *traho*, to draw, *i.e.*, the thoughts, off or away).

This isolating attention begins, as suggested above, in comparatively easy and simple processes. When, for example, a particular feature is specially prominent and interesting, *e.g.*, the lustre of a sun-lit sheet of water, the attention will be drawn to it in a reflex manner. The analysis or abstraction of thought differs from this easy operation in the fact that volitional effort is required. Thus we carry out a process of thought abstraction when, by a special exertion of volitional attention, we concentrate consciousness on a particular feature in a presentation-complex which does *not* at the moment strike and arouse the attention, *e.g.*, the precise tint of a very faintly coloured object, a disguised flavour in a dish, and so forth. Here the presence of other and more striking features which draw off the attention necessitates a severer effort of resistant concentration.

The nature of this process of analysis or abstract attention is

best seen in those comparatively simple operations in which an actual presentation-complex, as a group of tones or of colours, is being analysed.

The carrying out of such a process of analysis is aided by certain conditions, external and internal. To begin with an external condition, it is found that the closer the degree of the complication the more difficult the isolating fixation. Thus, while it is comparatively easy to attend to one detail of colour in an object locally separated from other colour details, it is exceedingly difficult to attend to the brightness or the degree of saturation of a colour apart from the quality of the hue itself.

Coming now to internal conditions we find that the detection of an element in a complex is aided by familiarity with this element apart from its present concomitants. Thus the singling out of the partial tones of a clang is greatly furthered by the circumstance that *these occur and are known apart from the ground tone* and so are the more readily picked out and recognised. This previous experience, by allowing a distinct *idea* of the constituent, aids, as we saw above, in the analytic selection of this constituent by attention. Not only so, the separate detection of a particular presentative element is favoured by special interest in the same. A fine ear for clang-effect or timbre can more readily fix its attention on this. Such special interest works mainly through what is known as practice. *What we are interested in noting, and so accustomed to note, we are able to detect readily.*

(*b*) **Synthesis: Conscious Relating.** In the second place, all thought is integrating or combining; or, as it is commonly expressed, it is a process of Synthesis. In thinking we never merely isolate or abstract. We resolve analytically the presentation-complexes of our concrete experience only in order to establish certain relations among them. The most appropriate term for all such conscious 'relating' or discernment of relation is comparison.

As was seen above, all presentative material is given in certain relations or connexions, including that of co-existence or co-inherence in a substance, between the several qualities of a thing.

Thus the different parts of an extended body stand in certain spatial relations one to another, one part being situated to the right of the other, and so forth; and, further, the object as a whole holds like relations to other adjacent objects. To these space-relations must be added the time-relations of all events, such as the movements of objects, their changes of form, and so forth Lastly, with these 'external' relations are given the so-called 'internal' relations of difference and likeness.

As long as we perceive or imagine the concrete object as such we have only a vague 'implicit' knowledge of these relations. Thus a child in looking at a house sees *implicitly* the chimney in a definite spatial relation to the mass of the building, but the clear *explicit* grasp of this relation is a subsequent process going beyond perception, and involving a rudiment of what we mark off as thought. The same remark holds good (as we saw above) with respect to the all-comprehensive relations of dissimilarity and similarity. In perceiving a particular object, say a tree, though a child differentiates it from surrounding objects and assimilates it to previously seen trees, the consciousness of difference and likeness is here implicit only. It is some way from this implicit or unconscious discrimination and assimilation to comparison proper, issuing in a clear or explicit consciousness of a relation of likeness or of unlikeness.

All such explicit grasp of relation involves a new direction of adjustive effort, or of (volitional) attention. Just as the analytic resolution of a complex demands a special effort in the way of limited concentration and resistance to irrelevant concomitants, so the comparison of two presentations, in order to discern their relation, imposes a further special task in the shape of a comprehensive grasp. The special difficulties of this mode of combining attention have already been touched on.

The process of synthetic or relating activity just described may take the direction of consciously grasping the relations immediately given along with presentations, more particularly the co-existence of attributes in the same object, and the space- and time-relations of presentations. It is, however, in discerning the

most comprehensive relations of likeness and unlikeness that thought shows itself most clearly to be a synthetic process. Comparison has, in a special manner, to do with the detection of similarity and dissimilarity or difference

Comparison.

Discernment of Likeness and of Difference. It has already been pointed out that likeness and unlikeness are two perfectly distinct relations. To apprehend a similarity between two sensations, say tones, is an intellectual process which we all recognise as radically unlike that of apprehending a difference.

Yet while the consciousness of likeness and that of difference are thus radically distinct as psychical processes, it is evident that the two relations are presented together in close connexion. This is obvious in the case of all complex presentations, as when we assimilate a lady's dress and a fruit on the ground of a colour resemblance. Since, too, as we saw above, even in the case of sensation-elements, likeness is a thing of degree, shading off from perfect likeness or indistinguishableness to just recognisable affinity, it follows that here, also, likeness and difference are given together in mutual implication. Hence it may be said that all comparison includes some amount both of assimilation and of discrimination. That is to say, we either see a likeness *amid differences*, *e.g.*, a common trait in two otherwise dissimilar faces; or, on the other hand, we distinguish two objects by reference to some *common* quality, as when we notice a contrast of timbre in two voices, which common element constitutes the ground or *fundamentum* of the comparison

At the same time, it is evident that the one process usually, if not in all cases, preponderates over the other. We are now specially interested in the likeness of two objects, say two faces, or two literary styles, the moment after perhaps in their difference. Accordingly we may say that comparison is the noting of likeness against a dimly apprehended background of

difference, or of difference against a dimly apprehended background of similarity.

General Conditions of Comparison. Comparison, whether specially directed to likeness or to unlikeness, has certain common conditions. These may be divided into (1) external or objective, those involved in the nature or concomitants of the presentations considered as features of our common perception, and (2) internal or subjective, those connected with the nature of the individual mind.

(1) **Objective Conditions of Comparison.** The most important of these are reducible to three heads. (*a*) Strength or intensity of the presentations compared; (*b*) Distinctness of the ground of comparison or common factor; and (*c*) Juxtaposition in time and space. A word or two on each of these may suffice.

(*a*) It is obvious that if we are to compare two presentations, these must present themselves with a measure of force and persistence. We cannot compare the pitch of two tones if they fall below a certain degree of intensity, or are not sufficiently prolonged. There is a certain moderate intensity of impression which is most favourable to comparison We detect the finest difference of brightness in the median region of the scale of luminosity.

(*b*) As remarked above, all comparison presupposes a *fundamentum*, or common aspect, in the things to be compared. And the difficulty of comparison varies inversely with the distinctness and prominence of this element. Thus, to take an obvious instance, we cannot compare two tones in respect of pitch if this is unsteady and variable from moment to moment, or two colours if they are not pure.

In comparing any two complex presentations there is a further difficulty due to the need of a preliminary analysis, the discrimination and selection of the ground of comparison. It is found that the difficulty in this case varies inversely with the prominence of the element. By prominence is here meant its impressiveness relatively to that of the other elements. Thus it is difficult to compare two handwritings, two musical styles, and so on, in re-

spect of some subtle feature that is apt to be overpowered by more palpable and striking traits.

(*c*) The presentations must be capable of being brought before the mind in the way most favourable to comparison. With respect to temporal conditions, it might at first be supposed that the simultaneous presentation of two impressions is preferable to the successive presentation. But though the simultaneous occurrence of two sensations furnishes one condition of comparison, *viz.*, proximity, it has, in many cases, countervailing disadvantages: such as a tendency of the sensations to run together and become confused. Weber found that two weights are much less exactly compared when lifted simultaneously by the two hands than when tested successively by the same hand.

In the case of impressions presented in space, a certain local proximity is necessary for the finest comparison. Thus the most delicate discrimination of tint shows itself with respect to colours laid side by side, and at their common boundary.

(2) **Subjective Conditions of Comparison.** (*a*) Since comparison is a mode of intellectual activity involving voluntary attention and concentration of mind, it obviously pre-supposes all the psycho-physical conditions necessary to such concentration. Thus it implies a favourable condition of the brain at the time, and also a well-practised faculty of mental concentration. Since, moreover, comparison is a special mode of concentration, *viz.*, a viewing of two things under some relation, it depends on previous practice in this particular line of activity.

(*b*) In the second place, the act of comparison varies with the pre-existing attitude of mind with respect to the contents selected and the ground of comparison. In the case of simple sensuous contents, that is to say, sensations, much will obviously depend on the individual's special degree of sensibility in relation to the particular class selected. A good discriminative eye for colours and a vivid interest in these (which may be supposed in general to accompany the former) are clearly a condition of a nice comparison of the same. In the case of complex presentations our facility in comparing will vary directly with our special familiarity

with and interest in the ground of comparison, and inversely as the attractive force of the other elements, a fact illustrated in the difference between an artist's and an ordinary person's comparisons of scenery, human faces, and so forth

(*c*) A word must be added on the effect of mental preparation or preadjustment of mental vision. It is evident that when we are definitely on the look-out for a similarity or difference *in some known particular* the act of comparison will be facilitated. In this case we are saved the labour of analysis and of selecting the ground of comparison. Thus, if I am asked to compare two flowers with respect to depth of colour or delicacy of texture, the whole process is shortened by the preliminary act of adjustment.

Discriminative and Assimilative Comparison. Comparison is in many cases a determinate process, that is to say, it is specially concerned with the detection either of difference or of similarity. In this determinate form of the comparative process we have, it is evident, a special preadjustment of mind for one of the two relations. Thus, in comparing two prints or two coins in order to see their difference, we start with a vague representation of some difference, which representation becomes a definite apprehension by combining with the actual presentation of a certain point (or certain points) of difference in the objects.

Here it is evident special favouring conditions will come in. Thus a preferential interest in similarity, and a practised aptitude for noting this relation, will greatly further the detection of this relation. The like holds good of the apprehension of difference. Hence the familiar fact that some people are quick to spy similarities in faces, in hand-writing, and so forth, while others are more alive to points of difference or contrast.

Other Forms of Comparison. We have here dealt with the process of comparison as employed in the detection of difference and similarity with a view to knowledge. But this is not the only purpose for which the operation is carried out. It plays a large part in connexion with the gratification of the feelings. The unexpected discovery of likeness or of unlikeness in things is a pleasant stimulus, and is made ample use of by the imagina-

tive writer. Thus, in the similes of the poet, ideas drawn from widely remote spheres of experience are brought into a relation of likeness, as when the sound of the summer sea is likened to merry laughter, a crafty man to a fox, and so forth. Here the object of the simile is to intensify the impression of some quality or aspect of an object by help of the image of a second object *in which this is embodied in a higher and more impressive form*. Since feeling is here the effect aimed at, there is no sharp analysis of likeness as in the case of purely intellectual comparisons. In this respect poetical comparisons differ from those employed for purposes of scientific illustration. Much the same may be said of poetical contrast. The points of difference are brought out in order to make the impression of contrast strong rather than to define with precision the exact nature and limits of the difference. A closer approximation to such precise analytical determination of likeness and unlikeness takes place in many of the comparisons of wit.

Connexion between Comparison and Analysis. A word or two may be added on the close connexion between these two directions of thought-activity. That there is such a connexion was pointed out above when we were dealing with the general relations of differentiation and assimilation; and the same fact has forced itself upon our notice in dealing with comparison.

To begin with, it has become evident that in the processes of comparison just described analysis is involved. Sometimes the analysis seems to precede the comparison, as when we are asked to compare two flowers in respect *of their colour*, in other cases it appears rather as the result of comparison. Thus it is by successive comparisons of members of a class of things, as flowers, that we gradually come to analyse out their common features.

While comparison thus involves abstraction, abstraction even in the case of a single object may be said to involve the rudiment of comparison. Thus, in analytically singling out for consideration the spherical form of a rain drop, we implicitly and subconsciously assimilate it to other previously known spherical objects.

It follows that thought is one process having two aspects or

distinguishable factors. Either of these may become predominant, according to special circumstances. In this way we obtain two varieties of operation, *viz*, analysis or abstraction, in which the recognition of likeness is sub-conscious, and (assimilative) comparison, where the process of analysis is preliminary and subordinate to a conscious apprehension of likeness.

General Thought. Thus far we have been occupied with the two fundamental processes in thought, and we have illustrated these in their simplest form as employed about presentations or their equivalents, concrete representations. But, as already pointed out, what we mean by thought is the representation of things as classes or generalities.

These fully-developed thought-processes are marked off by the use of what is known as the general idea or notion, such as *man* or *virtue*. General ideas, when reduced to a precise form, as by the logician, are spoken of as *concepts*, hence we may also speak of these explicit thought-processes as Conceptual Thought.

General thinking is a fuller development of the fundamental processes just considered. Thus the idea 'man' represents certain resemblances (common attributes, as a certain physical structure and degree of intelligence) running through a number of individual objects. These common resemblances are plainly discovered by the processes of analysis and comparison. More particularly thinking is the highest expression of the great intellective function, Assimilation.

While general thinking is thus obviously assimilation or recognition of relations of similarity, it is, in a less obvious way, conscious discrimination as well: to think of man is implicitly to mark off man from other things as brute. All clear thinking about things is thus at once a conscious grasp of relations of similarity along with relations of difference

One other characteristic of this (general) thought must be pointed out It is evident that, as an assimilation of a number of presentations on the ground of a common likeness, it is a process of combination or integration. To this we must now add that it is also a process of contiguous integration. Our general

thinking is carried out by help of language, and we connect ideas or thoughts with the appropriate forms of language by a process of associative integration.

Thought and Language. The uses of language as a medium of (concrete) reproduction have already been dealt with. We have now to consider another of its functions, *viz.*, its service as an instrument of thought, or, to express it otherwise, its aid in passing from a concrete or pictorial representation of objects to a general or conceptual representation of them.

It is commonly recognised that language is a factor in all general thinking. This is borne out by the fact of the uniform concomitance of language and thought. Thus language is, save in its most rudimentary form, absent in the case of brutes, which think at most in a very vague way. In the case of the child it begins to be mastered and to develop as the power of thought unfolds. And in the case of the human race as a whole we note that the structure of language becomes more complex as the thinking powers strengthen.

Without anticipating our fuller analysis of the process of conceptual thought we may point out, even at this stage, that language is a system of general signs. A name such as *man* or *virtue* has for its peculiar function the marking off of the results of that extended analysis and comparison just spoken of. It is evident, for example, that the name *man* has for its special meaning the common qualities (physical structure and intelligence) which we have discovered by comparison in this, that, and the other individual. And, as we shall see more fully by and by, it is just because we have in a name a means of thus marking a common resemblance among objects by one and the same sound, or other sensuous sign, that we are able to think conceptually at all.

Stages of Thinking. It is customary to distinguish three stages in the thinking process. First of all there is the formation of the general idea, notion or "concept," which may be said to constitute the element of thought, such as 'material body,' 'weight'. This part of the thinking process is marked off as Conception. After this comes the combining of two concepts in

the form of a statement or proposition, as when we say 'material bodies have weight'. This is termed an act of Judgment. Lastly, we have the operation by which the mind passes from certain judgments (or statements) to certain other judgments, as when from the assertions 'material substances have weight,' 'gases are material substances,' we proceed to the further assertion, 'gases have weight'. This process is described as Reasoning, or drawing an inference or conclusion.

These distinctions have been fixed by logicians and not psychologists. The mental processes here marked off by separate names are in spite of formal differences substantially the same. Not only so, as we shall see presently, conceiving, judging, and reasoning are not processes carried out separately, but rather distinguishable phases of a more complex operation. Nevertheless, since they have a value even for the psychologist, as marking off the more simple from the more complex forms of thinking, it is convenient to adopt the distinctions. We shall accordingly in the present chapter deal with the process of forming the thought-elements, or conception, and in the following chapter consider the fuller and more complete thought-process as expressed in the terms judging and reasoning.

General Ideas.

Nature of General Ideas. In seeking to trace the development of this general thinking we have, first of all, to consider the nature and the origin of general ideas. It is evident that we only distinctly think about things under their general aspect when we are able to form such ideas. Thus I cannot think out the proposition 'The mushroom is a fungus' until I am able to form the general ideas, 'mushroom' and 'fungus'.

A general idea may for our present purpose be defined as an idea having a general import or reference. Thus a child's idea of dog, house, or father becomes general when he consciously employs the term as the sign of this, that, and any other particular object which may answer to a certain description, or

be found to present certain characteristic attributes or traits Or, as the logicians express it, a general idea is a representation of a class of things.

Now it is evident that general ideas as thus defined are reached slowly and by degrees. It is exceedingly doubtful whether any of the lower animals acquire them. The baby does not possess them, and even after attaining to speech remains for a long time with only the rudiments of them. In their perfected articulate form, as required for exact scientific thought, they are confined to a few highly-trained minds.

Generic Image as Starting-point in Conception. The first stage in the formation of such general ideas is the welding together of a number of concrete images into what has been called a generic image. The idea 'tree' or 'house' may be taken as an example. Such generic images may be supposed to be formed by a process of assimilative cumulation. Let us imagine that a child, after observing one dog, sees a second. In this case the strong resemblance in the second to the first effects a process of assimilation analogous to the automatic assimilation already described. That is to say, the percept corresponding to the second animal is complicated with the submerged image of the first, which last is revived by means of easily apprehended points of likeness By such successive assimilations a cumulative effect is produced which has been likened to that of the superimposing of a number of photographic impressions taken from different members of a class (*e.g.*, criminals) whereby only common features attain to distinctness and so a typical form is produced.[1]

Such a process of cumulative assimilation would be largely passive, and independent of those active processes of comparison just described. It would further be capable of being carried forward (to some extent at least) independently of language. Thus we may, with some degree of confidence, attribute generic images to the child before he comes to the use of words as well

[1] This simile must not mislead the student into thinking that the images of the former percepts actually persist just as the earlier photographic impressions persist (*cf.* above, p. 100).

as to many of the lower animals. It is highly probable that a baby of six months forms a generic image of the human face, and that a predatory animal compounds a generic image corresponding to the species of his prey.

Such pictorial generic images do not necessarily carry with them any of that consciousness of general scope or import which is essential to a true general idea. At the same time they form a starting-point for the development of these.

The transition from the image to the general idea or notion is effected by processes of reflective attention in which abstraction and comparison play a chief part. In order to understand how this occurs, we may suppose the process of automatic assimilation checked by the introduction of some impressive difference. Thus a child possessing a generic image of dog proceeds to play with a visitor's dog, and finds it wanting in the friendly sentiments of previously known specimens. Here difference, which in the earlier stages of (automatic) assimilation remained indistinct in the background of consciousness, is brought forward. The unlikeness of *morale* in spite of the likeness of *physique* is forced on his attention, the present percept is separated from and opposed to the image, and a step is taken in marking off likeness from surrounding difference.

As differences thus come into distinct view and impress themselves on the mind as the constant accompaniment of likenesses, a new and explicit grasp of *likeness-in-difference* ensues. This starts from a mental separation of the several perceptual constituents of the generic image, and a reflective comparison of these one with another so as to mark off common features or likenesses from peculiar or variable features or unlikenesses. Such a conscious active separation of definite points of resemblance from among a confusing mass of difference is what psychologists and logicians more especially mean by Abstraction.

Differentiation of Notions of Individual and Class. The co-existence of likeness with unlikeness may mean one of two things, *viz.*, the identity of one individual object, in spite of certain changes, or a general similarity among a number of different

individuals. The process of conception is sometimes described as if the mind started with a definite knowledge of individuals, and then proceeded to generalise or form a class-idea. It is probable, however, that the two modes of interpreting likeness-in-difference are reached concurrently. Thus it seems most reasonable to suppose that the baby which 'da-das' every bearded person it sees is as yet clearly conscious neither of individuality nor of generality. In other words, we must not assume that it is stupidly confounding its father with a stranger, or, on the other hand, forming an idea of a general class. At this stage the child *merely recognises certain interesting similarities, and proceeds to express the fact.* We have to suppose that the clear apprehension of individual sameness is reached but slowly and in close connexion with the first clear consciousness of different things attached by a bond of likeness.

The Process of Generalisation. When once this differentiation of the individual-idea from the class idea has advanced far enough, the process of generalisation proper, or the grasp of common or general qualities, can be carried out in the methodical way usually described by psychologists. That is to say, a number of individual things, represented as such, are now compared, the attention is withdrawn by a volitional effort from points of difference and concentrated on points of likeness (abstraction), and so a true process of generalisation carried out. Such a mode of procedure must, however, be regarded as answering to a logical ideal rather than to the actual process of conception as observable in our every day thinking.

Conception and Naming. We have so far supposed that the processes of conception are carried out without any help from language. But it is exceedingly doubtful whether any such orderly process as that just described, the comparison of a number of percepts and the marking off of common attributes, could be achieved without the aid of words or some equivalent. It is probable that even a grasp of individual things as unities and as permanent identities depends on the use of a name (proper name), which as one and the same sound serves to mark in an emphatic

way the continued oneness of the object. And the same applies still more manifestly to the apprehension of a class of things. It is certain that in later life at least all clear thinking takes place by help of language. The general idea is held together and retained by means of a name. It is very uncertain whether in the absence of these and other general signs the infant or the lower animal ever attains to a clear consciousness of the 'one in the many,' the common aspect of a number of different objects.

The question how far we can generalise or form a general idea apart from the use of names or other signs is one of the standing *cruces* in psychology. The introspective examination of our own mental processes suggests that we do sometimes think with little if any help from words, *e.g.*, in discerning analogies in different persons' mode of talking or behaving for which we have no appropriate names. Yet, even if this is so, it is to be remembered that in such cases we are employing powers of thought that have been developed by help of language, and so may be said to depend indirectly on this.

If now we turn from the developed to the undeveloped mind, and ask whether children think apart from the use of language, we find the question exceedingly difficult. It has been alleged that one born a mute reached, prior to his mastery of a deaf-mute language, the highly abstract idea of maker or creator, and applied this to the world or totality of objects about him. But such mutes are known to make a certain spontaneous use of articulate sounds as signs, and such articulation, though unintelligible to others and not even heard by themselves, may be of great assistance in carrying out the process of abstraction. It must be further remembered that a normal child understands others' words, and may probably make some internal use of them as signs before he proceeds to articulate them imitatively. With respect to the lower animals, it must be admitted that they display something closely resembling the germ of general thinking. Yet it is manifest that we cannot, in this case, be certain of the degree of clear consciousness of generality attained. The actions of a fox caught in a difficulty and inventing a way of escape seem indistinguishable from those of a man thinking by help of general ideas and general rules. Yet the mental process may, after all, be non-conceptual and pictorial.

Psychological Function of General Names. The psychological process of word-formation has already been described in connexion with the linking together of contiguous trains. Here we have to inquire how the name which we have seen to be

at once a motor action (articulation) and an auditory sensation (articulate sound) assists in the formation of truly general ideas.

A name is commonly defined as a mark or sign by the help of which the idea of a thing may be called up in our own mind or in the mind of another. Signs are either self-explaining, as a drawing or an imitative gesture or sound, or conventionally attached to objects, as the larger number of linguistic signs or names, the symbols used in music, etc. Language-signs consist either of articulate or other percept-producing movements, as the finger movements used by the deaf and dumb.

A name may be given to one thing (proper name) or to a general class (common or general name). In either case, as explained above, it is, psychologically considered, the expression or indication of a similarity among our percepts. To name a thing is thus the outward manifestation of a process of assimilation.

The name (articulation-sound complex) becomes, as we saw, attached to the idea it stands for by a process of contiguous integration. Looking now at names as accompanying and perfecting the process of assimilation, we may say that, whether as employed by ourselves or as heard when used by others, they become specially associated with, and so expressive of, the similar features in our perceptual experience. Thus the name 'home' specially emphasises the recurring or constant features of the child's surroundings, the name 'house' the common features of structure in the objects so named.

Progressive Use of Names. In the beginning of life linguistic signs are used in close connexion with the process of automatic assimilation. Thus the recurrence of the presentation complex answering to a particular animal, as the dog, calls forth by a process analogous to a reflex movement, the articulation, let us say, of the sound 'bow-wow'. This use of words by the child to mark likeness is partly spontaneous, partly imitative. As is well known, children often invent names of their own, as in their pet-names for nurse, doll, and so forth. Thus one child used the sound 'mum' as a name of eatables generally, and another the

sound 'appa' as a name for this, that, and the other animal (kitten, chick, etc.). Children also spontaneously extend the use of names supplied by others, as when the sound 'ba' (ball) was applied to a bubble and other round objects. This spontaneous use of names gives place in time to an imitative use of them as heard by others.

From what was said above we have to suppose that names are used at the beginning neither as proper or singular, nor as general names. They merely serve to mark off and register common features of the child's experience. It is only as the processes of comparison gain in strength, and the difference between the individual and the general class becomes distinct, that the two uses of names as singular and general grow clearly differentiated. Thus the names Charles, Papa, Rover, and so forth, come to be marks of particular things, those organised experience-unities which are thought of as having continued existence independently of our intermittent percepts. Similarly, such general names as 'tree,' 'dog,' 'man,' come to be consciously applied to a number of such object-unities on the ground of common attributes.

At first we find this use of general names confined to classes of objects having numerous points of similarity, and so easily representable in the pictorial form of generic image, as "dog," "house," and the like. Here, as pointed out above, the name is not used with a clear consciousness of its general character or function. Yet the very application of one and the same name to similar percepts is an important aid to those processes of reflective comparison and selection of common features out of which the definite apprehension of generality arises.

The full use of general names only comes in on the completion of the processes of analytic comparison. On reflecting upon dogs, with a view to see in what exactly they do agree, in spite of their differences, and on gradually gaining clear consciousness of this, that, and the other characteristic feature of form and action, *a child marks off and definitely registers the results of his analysis and comparison by help of the name.*

When thus definitely attached by association to the points of

similarity singled out by abstraction from a number of particular objects the name is used as a true general sign. The image now takes on a much more definite function as a typical or representative image through the circumstance that, by help of the demarcating sign, certain features stand out distinctly, and are at the same time realised as belonging not merely to one particular thing, but to what we call a class. Thus the name 'dog,' though probably still calling up an image of a more or less concrete character, that is, including traits of some particular individual or variety, becomes a general sign inasmuch as it thrusts prominently forward, and so secures special attention to, certain definitely apprehended common class features (the canine form, action of barking, etc.).

Used now in this way as a general sign of certain definitely apprehended points of likeness or common qualities, the name acquires the double function attributed to it by logicians. That is to say, it *denotes* any one of a certain order or class of things: this class or group being determined in respect not of the number of things included, but only of the common qualification or description of its members, that is to say, of the qualities which the name is said to *connote*.

Formation of more Abstract Notions. A similar process of comparison and abstraction, clenched by a linguistic sign, takes place in the formation of those general ideas which answer to few common qualities, and are altogether removed from the plane of the generic image, as, for example, 'animal'. It is obvious that we cannot compound a *quasi* concrete image of the animal, as we can, roughly at least, compound an image of the dog. There is no common form running through the vast variety of animals which renders this possible. There is, indeed, an image element here too. In thinking of animal, children and most adults probably image imperfectly one of the more familiar quadrupeds, but in this case attention to the image is overpowered by attention to its wide representative function. Hence a child cannot form a proper general idea answering to 'animal' till he has attained a considerable skill in the use of verbal signs *as general.*

These higher steps in the thought-process become possible by means of the verbally embodied results of the lower steps. It is after the child has formed the general ideas, 'dog,' 'horse,' and so forth, that he climbs to the more difficult, more comprehensive, and more abstract idea, 'animal'. In this way we may say, with Hamilton: "Language is to the mind precisely what the arch is to the tunnel. The power of thinking and the power of excavation are not dependent on the word in the one case, on the mason-work in the other; but without these subsidiaries neither process could be carried on beyond its rudimentary commencement."

Names as Substitutes for Ideas. One other feature of verbal signs requires to be noticed in this connexion, *viz.*, their tendency with repeated use to drop all distinct ideational suggestiveness, and to serve in themselves as substitutes for ideas. This function of names will grow clearer to us when we come to consider the more complex processes of thought, but it may be illustrated, to some extent, at the present stage of our exposition.

It follows from the very nature of a name as a general sign that its meaning will only be distinctly grasped in exceptional circumstances, when a special effort of attention is given. Thus I have to fix my thoughts on so familiar a name as "metal," "crystal," "nation," and so forth, if I want to have a full and clear idea of the corresponding thing (or class of things). It is obviously a much easier and shorter process to recall an 'internal' (that is, unspoken) name, and even to speak or write one, than to develop clearly the corresponding object-idea. Hence in all those every-day processes of thought in which a full and distinct ideation is not required, where relations among ideas may be clearly apprehended with only the faintest representation of the particular kind of object dealt with, we tend to use names as substitutes. Thus in following out the simple process of thought, "a bat cannot be a bird because it suckles its young," I can see the relation with only the very faintest representation of what the terms bat and bird signify.

Conception as Dependent on Social Environment. It is evident from this brief sketch of the development of the

general idea that it is a process which is largely dependent on the action of the social environment. Language is pre-eminently the invention and instrument of social life. It is the medium by which we communicate one to another our ideas, wishes, and so forth. In the early years of life the undeveloped intelligence of the child is continually stimulated in the way described above by the common use of general names. The results of ages of thought-processes embodied in the language of educated men and women are thus brought to bear on the growing mind, and these constitute a main ingredient in the educational influence of the community upon the individual. The profound and far-reaching influence of this medium of common word-embodied ideas is clearly seen in the arrest of intellectual development where contact with the general mind, through language, is excluded, as in the case of neglected deaf-mutes, and, to a lesser degree, of those who from the isolation of circumstances are withdrawn from the stimulating influence of the higher phases of thought as expressed in the language of educated persons. As Professor Huxley says: "A race of dumb men deprived of all communication with those who could speak would be little indeed removed from the brutes".

Psychology of Language: Nominalism and Conceptualism. The precise psychological function of language has given rise to much discussion. That names are a material aid to the formation of general, or, as they have been called by Locke and others, 'abstract' ideas, is certain: yet there is little agreement as to the extent or precise nature of their service in thought. Thus, it is still a matter of dispute whether any general thinking properly so called is possible without the use of language or some equivalent system of general signs. It has been said that deaf mutes think, that the lower animals reason in a general way, and that in the history of the race as also of the individual a grasp of generality precedes the use of the name. The point does not as yet lend itself to complete proof or disproof.

The perplexity of the question regarding the precise nature of the function of language in thought is brought out in the dispute between Nominalism and Conceptualism. This had its origin in a properly *philosophical* question, namely, that respecting the nature of general *knowledge*. It was asked whether there is any external reality corresponding to our general notion, *e.g.*, 'man,' over and above that of the individual men whom we have seen, or we or others might see. Certain thinkers have held that there is

such a universal reality, that in the region of eternal existence there is something corresponding to 'man' as distinct from 'James Smith,' 'John Brown,' etc. These were called Realists.[1] In opposition to these the Nominalists asserted that the universal or general has no existence in the realm of nature or objective reality, but only appertains to the name as a common sign which is applicable indifferently to this, that, and the other object which are found to resemble one another in certain respects.

In modern times the controversy has tended to assume the character of a *psychological* discussion. Instead of the ancient Realists we have the Conceptualists, who assert that our *ideas* may be general, or that the mind has, over and above the power of picturing individual objects, that of forming general notions, or ideas of classes of things. These general ideas are not 'sensible representations' of individual objects, but 'abstract' ideas, that is, representations of the common features (or the relations of similarity) of many individuals. In opposition to these the Nominalists assert that when we use general names we are still picturing or imagining the individual, but in a very imperfect way, that is, by attending exclusively to certain features marked off by the general name. The nature of the concept is only understood by considering the function of general signs. Inasmuch as a name is such a sign, applicable alike to an indefinite number of individual objects, we are able by means of it to view a mental image as presenting features common to it and other presentations. The name man, though calling up a more or less distinct pictorial image of a concrete man, at the same time emphasises the features in this image which answer to common human traits. In this way the image, though in itself as image particular and concrete, becomes representative of an indefinite group of like things, that is to say, of a class.

Conception as Synthesis. Many of our notions involve, in addition to a process of abstraction and analysis, one of combination or synthesis. That is to say, we require to regroup the results of abstraction in *new* combinations. Thus, in the study of history, we have to build up out of the results of observation and abstraction such notions as 'Roman Emperor,' 'feudal system,' and the like.

This synthetic formation of complex concepts goes on in close connexion with a process of constructive imagination. By this last an image (or a number of images) is first elaborated, which gives the peculiar form or structure to the concept. In this way,

[1] That is, conceptual not perceptual realists. (*Cf.* above, p. 166.)

for example, we should form an idea of a class of objects lying outside the range of our personal observation, as Roman consul, volcano, and so forth.

In a certain class of cases this basis of constructive imagination assumes the peculiar form of an incomplete or partially baffled imagination. The general notion here becomes still further removed from the sphere of concrete or pictorial representation. This transcending by thought of the limits of clear imagination is illustrated in the formation of ideas of objects of great magnitude and of these magnitudes themselves, such as nation, planet, a century, a thousand miles, and so forth. All such notions are reached by a process of prolonged summation or addition of magnitudes which are themselves perceptible by the senses and consequently picturable by the imagination. Thus, in forming an idea of a planet, we have to take some familiar magnitude, say that of a school globe, and imaginatively amplify this by successive additions.

The nature of this process is clearly illustrated in the ideas of all the larger numbers. The smaller numerical groups, as three, six, etc., present certain visual peculiarities, and as such can be seen or sensibly intuited. Hence the child's ideas of these smaller numbers are obtained in close connexion with sense perception by comparing different local arrangements of the same aggregate of objects, as six marbles, and numerically similar aggregates of different objects, as six pebbles and six sheep. Even in the case of these smaller numbers, however, a process of taking apart and putting together (analysis and synthesis) is necessary. We only fully apprehend 5 or 6 as a particular number when we know its mode of production by a summation of units. In the case of the larger numbers, 20, 100, 1000, etc., this process of summation makes up the whole meaning of the number symbol. The symbol 100 corresponds to no clear intuition of sight, consequently to no clear visual image. It stands for the unpicturable result of a prolonged process of summing, counting, or reckoning, performed on units (or small groups of these) which are themselves picturable.

This peculiarity of our ideas of number is illustrated in the lateness of their formation in the development of intelligence. The lower animals have but a germ of the idea of number. A bird will notice certain differences, *e.g.*, the withdrawal of two eggs from a nest of four, but such differences are probably not realised as numerical. Similarly with the ideas of number of primitive man. The aboriginal Australian can rarely count his five fingers, and no Australian language contains numerals above four, all numbers beyond this being described as 'many'. In the case of a child educated in a civilised community, it is some time before numbers are clearly apprehended as such. Thus, a child of three and a half, generally observant and intelligent, and capable of comparing the magnitudes of things (*e.g.*, the heights of two persons), showed an almost complete inability to apprehend relations of number. Though taught to say one, two, three, etc., in connexion with concrete objects, he persisted in confounding number or discrete quantity with magnitude or continuous quantity. For example, on seeing beads of three sizes, he called the smallest 'four,' those next in size 'five,' and the largest 'six'.

The synthetic construction here described is illustrated in a somewhat different way in the formation of another class of notions. Our idea of a mathematical line, a circle, and so forth, does not exactly answer to any observable form. No straight line, for instance, discoverable in any actual object perfectly answers to the geometric definition. Even the most carefully drawn line would be found on closer inspection to deviate to some extent from the required type. It follows that these notions involve more than a simple process of abstraction, such as suffices, for example, for the detection of the quality, colour, or weight. They presuppose in addition to this a process of *idealisation*, that is to say, the perfecting by help of symbols beyond the limits of clear imagination of some feature or attribute presented in a rough or imperfect form in actual objects. A like process of symbolic idealisation enters into some of the conceptions of physical science, as a smooth plane, a rigid body, and so forth.

The Control of Conception: The Logical Concept.

This is not the place to trace out in detail the processes by which logic seeks to transform our first crude general ideas into true concepts. A word may, however, be given to these processes so far as they illustrate the carrying forward of the psychological process of conception as here described.

A child's first general ideas are apt to be imperfect in more ways than one. Thus to begin with they are commonly wanting in distinctness and precision. A child and an uneducated adult are wont to use terms as 'water,' 'metal,' 'plant,' and so forth, with only a very vague representation of the common qualities possessed by the objects making up these classes. That is to say, the process of comparing things and analytically marking off common features is incomplete. As a consequence of the connotation of the name being thus hazy, the denotation remains uncertain. Thus, owing to a vague apprehension of the essential characters of a plant, a child may be uncertain whether the sea anemone is a plant.

In addition to this indistinctness the general idea may become positively erroneous as judged by the standard of the common, or rather what is called the correct, usage of the term. Thus through the narrow range of his experience a child is very apt to import non-essential elements into the represented class-features, and by thus adding unduly to the connotation to narrow unduly the denotation of the term. In this way, for example, he makes 'rose' stand only for red roses, 'book' for printed book, 'metal' for solid metal. And while he thus tends, in one direction, to make the connotation of his words too full, and so their denotation too narrow, he tends, in another direction, to the reverse error. Since he cannot at first detect the deeper and less conspicuous resemblances among things, he is liable to omit some of the essential qualities of the class, and so to unduly widen its extent, as when he uses the word 'fish' for all animals that live in the water, not noting the important structural peculiarities that constitute the true fish.

These defects are rectified by the processes of education and scientific training. By these agencies the mind is disciplined in

a more cautious, far-reaching, and methodical process of conception. A larger number of representative instances of the class are now examined. The analysis of points of likeness is carried further, so as to be made logically complete, that is, adequate for purposes of scientific classification. The crowning phase of this logical regulation of conception is known as definition, or the gathering up and fixing in precise and appropriate language of each of the essential and fundamental attributes of the class.

One other feature has to be noted in this logical treatment of the concept. We have supposed that the process of conception is wholly occupied with disengaging similarities. But all thinking processes illustrate at once the two fundamental intellective functions, discrimination and assimilation, though one of these may preponderate, and be more conspicuous in particular cases. This applies to the formation of general notions. Although in forming the concept 'animal' we are explicitly setting forth similarities among diverse things, we are implicitly marking off the class from other things (plants and inanimate objects) which lack these similar features. The logical manipulation of the concept renders this apprehension of difference explicit and clear. Thus the process of defining a class-name includes in its most complete form an examination not only of things denoted by the name, but also of things not so denoted, in order to see what features they are wanting in. This consideration of differences becomes a prominent feature in the marking off of one idea from a kindred yet partially dissimilar idea, as metal from mineral, wise from learned, and so forth, a process that plays a large part in the definition of general names.[1] Finally, in what is known as logical Division or Classification, where things are systematically arranged in higher and lower groups, attention is paid at once to points of similarity and to points of difference.

[1] The marking off of an idea from other ideas tends, according to the language of Locke, to make it 'distinct,' whereas the bringing out of the several constituent qualities making up the connotation of a name would serve to render an idea 'clear'. But the terms clear and distinct as applied to our general ideas are not used by all writers in this way.

REFERENCES FOR READING.

On the process of abstraction and the formation of concepts, consult Sir W. Hamilton, *Lectures on Metaphysics*, lect. xxxiv.; Prof. Bain, *Mental Science*, bk. ii. chap. v.; M. Taine, *On Intelligence*, pt. ii. bk. iv. For an account of the early development of the generalising power the student may turn to Prof. Preyer's work, *The Mind of the Child* (American translation).

CHAPTER XI.

PROCESSES OF THOUGHT (*CONTINUED*): JUDGMENT AND REASONING (KNOWLEDGE).

Thinking, considered formally or as logic treats of it, includes, as we have seen, besides the elementary stage of conception, or the process of forming concepts, the more complex operations commonly marked off as judging and reasoning. Having a concept we may go on to apply this to some individual thing or class of things, as when we decide that a particular piece of stone is granite, or that diamonds are combustible. We are then said to judge, or form a judgment. And having framed such judgments we may, setting out from these, pass on to others, as when we conclude that air has weight because all material substances have weight. We are then said to reason. These two fuller processes of thinking, which are closely connected one with the other, are to be the subject of the present chapter.

JUDGMENT.

The Mental Process in Judging. In every-day discourse the word judge is used to express the process of coming to a decision about a thing, when we do not reason out a conclusion explicitly or formally, but apply in a rapid and automatic manner the results of past experience to a new case. Thus we judge that a man is sincere or insincere, that a plan is good or bad, and so forth. For the purposes of psychology and logic it is usual to extend the application of the term to all those mental operations which underlie what is called assertion or predication. We judge in so far as we assert something, or, as logicians put it, predicate

something of a subject, or are prepared to do this. The mental operation here described may provisionally be defined as an explicit apprehension of a relation between two things (or a thing and its quality) as distinguished from a mere apprehension of a thing or a class of things.

This definition of the process of judgment by reference to its verbal expression suggests that the two are organically connected. And this is the case with all clear and explicit judgment. The connexion between judging and asserting in words is precisely similar to that between forming a concept and naming. At the same time it is important to note the fact that there is a rudimentary process of judging which is prior to and independent of language. Thus the lower animals are capable of reaching decisions respecting the proximity of their prey and so forth; and the child begins to judge before it can set forth its decisions in clear articulate propositions. Not only so, we all carry out in connexion with perception implicit acts of judgment which do not clothe themselves in language external or internal, as in determining the size or distance of an object, or its position in relation to a second object.

Looking further at the propositional or worded judgment, we see that in its common logical form it is made up of two representative ideas or notions, which are brought into a certain relation one to another. Of these notions the one answering to the predicate, or that which is asserted, is always general. On the other hand, the idea answering to the subject may be either a singular or a general notion, and in this way we get the distinction of singular and universal judgments, *e.g.*, 'This cat scratches,' 'All cats scratch'.

Relation of Judgment to Conception. According to the formal or logical view of the matter, judgment differs from conception, is more complex, and presupposes it. From a psychological point of view, however, which looks at the actual processes of thought, we must say that what we call a concept has no separate existence. We never say or think 'man' out of all relation to other things. Hence the judgment is the starting-

point in thought, and the simplest process of thought properly so called. What is artificially set out by the logician as a detached concept or element of thought is, in reality, the last stage or the product of a judgment, or rather of a series of judgments. Since we form our general notions by discovering similarities among things, and since the clear explicit recognition of a relation of similarity is a true judgment, it follows that a rudiment of judgment is involved in all conception.

We may say then that the two processes marked off by logicians as Conception and Judgment are not essentially different. As formally distinguishable phases of the thought-process they react one on the other. We only reach a general notion at all by means of a comparative detection of likeness, which, when explicit, is judgment. Conversely, since our ordinary judgments involve general notions, we may say that it is only after carrying out some measure of conception that we are prepared for the higher and more elaborate type of judgment.

Judging a Process of Mental Synthesis. To judge, according to logical form, is, as we have seen, to combine two notions answering to the subject and the predicate of the proposition. Thus when a child judges that his milk is hot, or that Pussy is cross, he is, it is manifest, bringing the two ideas milk and hot, Pussy and cross, into mental juxtaposition, and connecting them one with another. This connexion between the ideas or notions involves a representation of an objective relation between the corresponding things. Thus in judging that his milk is hot the child is attributing the quality or state of heat to the thing milk. This conscious apprehension of a relation between two things is, as was pointed out above, what is known as mental synthesis. We may say then that *judgment is the full explicit carrying out of a process of synthesis.*

If we now ask how this process of combining ideas in the form of a judgment comes about we see that it is only a further illustration of the three intellective functions, discrimination, assimilation, and associative integration. Thus every judgment respecting difference or likeness in things is but the final outcome

of that process of reflective comparison dealt with above. In other words, every detection of unlikeness or likeness when it grows clear and explicit expresses itself in a judgment of the form, 'A and B are like' or 'unlike'. Further, every clear apprehension of a relation of time, place, conjunction of qualities in an object, or other mode of contiguous conjunction of presentations, issues in a judgment. In this way we obtain such forms as: 'A is after B' (in time), 'A is at the side of B' (in space), 'A has the quality B'. We may thus say that the full reflective carrying out of each of the three intellective functions expresses itself in the form of a judgment. A word or two by way of illustration of these different directions of the process of judgment-synthesis must suffice.

(1) **Setting Forth of Relations of Difference and Likeness: Identity.** After what has been said under the head of comparison on the detection of the fundamental relations of difference and likeness little need be here added. That we bring things into a relation of likeness, as when we judge that a violet is like a pansy, that two lines are equal (*i.e.*, perfectly like) in length, seems intelligible enough. It is somewhat otherwise in the case of detecting difference. Difference does not seem to be a binding relation in the same sense as likeness. To see things merely as different is to separate rather than to combine, and does not give rise to any customary form of judgment. Thus we do not think or say that the colour red is different from the taste of a walnut, or that roast beef is different from an eclipse of the sun. As pointed out above, we do not under ordinary circumstances occupy ourselves about mere difference. Nevertheless, a large number of our judgments undoubtedly have to do with the setting forth of difference. Thus we are interested in and observe differences among homogeneous presentations, as when we say two colours differ in respect of hue, intensity, and so forth. This establishment of a relation is especially manifest in the case of all the more familiar contrasts where, as we have seen, the distinguishing and opposing is fundamental and its result fixed by language, as also by special interest (*cf.* above, p. 205).

Under the general head of relations of likeness and difference come relations of quantity. The relations specially set forth in the sciences of quantity, arithmetic, geometry, etc., are those of equality and its correlative inequality, in its two aspects greater or less. This equality (or inequality) may hold with respect to discrete or numerical quantity, *e.g.*, $3 + 2 = 5$, or to continuous quantity, *e.g.*, "The angles at the base of an isosceles triangle are equal to one another". Such equality is plainly likeness *in respect of quantity or amount.* It constitutes the type of perfect likeness. To this extent judgments of quantity differ psychologically from other judgments. The source of this peculiarity in mathematical judgment, *viz.*, the detection of perfect likeness or equality, lies in the very perception of quantity. Thus, as is well known, the comparison of two lines in respect of length is carried out by means of juxtaposition by which the eye at once sees with an approach to accuracy whether the one extends beyond the other. With respect to numerical equality an approximately exact type of judgment grows out of those processes of number-formation already referred to. Numerical equality is equality or equivalence in respect of counting or summation of units.

An interesting modification of the relation of likeness is that of identity or sameness Many of our judgments obviously have to do with this relation.

We may here distinguish between what has been called "material" identity, that is, the presence in two or more things of a common element, as a particular colour, and "individual" identity. The former, being a point of likeness, that is, a perfectly similar element, recurring at different times, is opposed to difference of kind. Thus 'the same colour' is opposed to a discernible difference in colour. The latter, which is the relation of identity commonly spoken of, is opposed to numerical difference or individual distinctness. 'The same man' is opposed to two distinct men.

The germ of identification proper, that is, the identifying of an individual thing, appears, as we saw, in perceptual recognition. Here, however, what we call recognition is at first not more than an act of assimilation or the detection of a material sameness, *e.g.*, the common presentative constituents in the group answering to 'mother,' 'dog,' and so forth. Before the clear consciousness of individual sameness arises the child must have advanced some

way in the formation of the idea of the external world as a permanent arrangement or system. Thus when he says, 'This is my doll,' he must realise not merely that the present presentation is materially the same as, that is, perfectly like (in certain features), previous presentations, but that it has persisted in the interval in the sense of having been at any moment renewable by fulfilling certain conditions (*e.g.*, movement to a particular place). In other words, a judgment of sameness involves the idea of the temporal continuity of our presentations, or their permanent renewability.

When this consciousness of continuous objective existence in a particular place (or succession of related places) independently of our occasional perception grows clear, the child learns, as was hinted above, to recognise a thing as the same in spite of considerable difference. Thus he recognises the broken toy as the same as the once intact toy, just because he realises the continuity of existence under the altered conditions.

(2) **Setting Forth of Relations of Space and Time: Substance and Cause.** In addition to judgments which have to do with likeness and unlikeness there are others which especially set forth relations of space and time. Thus a child observes the position of an object, and sets forth the fact, as in saying, 'Puss is under the table'; or he observes the succession of two events, as when he says, 'Carlo is gone after father,' and so forth.

Closely connected with the apprehension of time- and space-relations is that of the relation of an attribute to its substance (co-existence or co-inherence), as when the child says, "The grass is wet". This relation plays so large a part in our every day thought that logicians often speak of it as if it were the only relation set forth by propositions. The psychological development of the idea of substance as the groundwork of the presentative, or, more correctly, the presentative-representative unity which we call a percept, has been traced out above. The idea of the substantial reality, table, sugar, and so forth, is derived from the experience of active touch. When, therefore, we qualify such a substantial reality, as in attributing sweetness to the sugar, we are connecting

the sense-experience underlying the idea of sweetness with this fundamental touch-experience. As was pointed out above, the relation of co-existence here referred to involves at once a temporal and a spatial relation.

One other class of judgments requires to be mentioned here on account of their importance and the large place they fill in our every-day thought, *viz.*, those which have to do with agency, production of effect, or, as it is commonly called, causation.

The apprehension of a causal relation arises in connexion with that of a *sequence* of events or occurrences, and more particularly such as are of great practical interest and immediate, *e.g.*, the succession of pain on a blow. The repetition of the succession serves in a way already touched on to draw attention to the connexion.

Among the first instances to be observed by the child would be the effects of its own actions. When by a movement he immediately gains some benefit, as in chafing an irritable spot on the skin, he has presented a succession of great practical interest, and one which, by repetition, easily lends itself to the discovery of a regular connexion. But this is not all. The child's movements, even before they take on the clearly voluntary character, involve as muscular actions palpable changes in his consciousness which he can hardly fail to note. It is, indeed, only when we ourselves produce an effect by the use of our muscular powers that we have a direct consciousness of causal agency so far as this involves the idea of force or power. Hence it seems natural to suppose that the race and the individual acquire their first dim apprehension of the causal relation through the observation of their own actions.

That it is this experience which supplies the crude form of the idea of the causal relation seems to be shown by the fact that the first verbal expression of a causal judgment is the setting forth of a conscious action of man or animal, as in the proposition, 'The dog barks'. The conclusion is further supported by the circumstance that at this stage of intellectual development all natural processes are viewed as analogous to conscious actions. Thus,

the ball 'strikes' just as the child himself strikes, the arrow 'flies' just as the bird flies, and so forth. The child is here in much the same mental condition as the savage who personifies inanimate objects, regarding them as the source of *quasi*-conscious actions resembling his own.

This anthropomorphic view of causal agency is further seen in the attribution of something analogous to an end or purpose to physical actions. "What is the snow sent for?" is just as natural a question to the childish mind as, "Where does the snow come from?" A child of two years accounted for a pebble in his box of bricks by the supposition that it wanted to play with the bricks. In truth, like his prototype, the savage, he seems only able to conceive of natural phenomena as subserving some purpose, that is, as controlled by some volitional agency.

It may be added that, long after the idea of physical causation has been differentiated from that of action for end or final causation, the former retains marks of its psychological origin. We cannot represent natural objects as agents save by forms of language which betray a fixed and unalterable habit of regarding all changes in our environment as a product of *quasi*-human action or voluntary movement. This applies even to the highly abstract conceptions of force, energy, and the like, employed by science.

The development of the idea of causal agency is a slow process. In the case of the race and of the individual alike we see that the mind remains for a long time satisfied with the reference of a comparatively few phenomena, *viz.*, those involving personal benefit or injury, to causal agency. With respect to the vast majority of the changes in the environment, it shows itself incurious. The predominance of the anthropomorphic view, moreover, tends to confine the application of the causal idea to cases where there is a discoverable analogy to human action, and more particularly the movements of things. It is only on the higher levels of culture in races and in individuals that a clear grasp of causation as a universal relation is attained.

General Antecedents of Judgment. By help of this examination of the customary forms of the thought-synthesis we

may indicate the more general psychical antecedents of the process of judging. We judge when our attention is specially drawn to a relation of difference, likeness, identity, and so forth. Thus a common stimulus to judgment is the observation of some change in our surroundings, as when a child notes that Pussy is dirty, that his hat is on the floor (a new relation of place), and so forth.

Next to these presentative conditions of judgment we have certain representative ones. It may be said that we never judge without making use of pre-existing ideas. Even when the child says, 'Puss is dirty,' he must, it is obvious, be in possession of the idea of dirtiness. The assimilative function, which runs through all varieties of judgment, depends on a firm retention of ideas. We cannot say 'This tone is a C' without having in the mind a clear standard-idea of that note. Further, the suggestive processes of contiguity and similarity play a large part in the formation of our judgments. Indeed, *when not immediately prompted by a presented relation our judgments are always formed by help of suggestion.* This applies to all relations of time, place, substance and cause that disclose themselves by means of a process of contiguous reinstatement.

While, however, the particular combination of elements in a judgment is thus always ultimately conditioned, it involves in all its more explicit forms an active and selective factor. Thus even where the relation is directly presented, *e.g.*, in the spatial relation of two simultaneously perceived objects, it is evident that the attention must direct itself to this relation, and selectively bring it into mental prominence. In many cases, too, this active element becomes more marked, as where the complex reproductive processes are involved, and associative tendencies have to be controlled. Thus in answering the question, 'Who was the author of a particular work?' the active element takes the form of a volitional control of the suggestive mechanism, fixing or keeping before the mind what is helpful, and excluding irrelevant suggestions. It is only in special cases, where the mind is prepared by a process of preadjustment, or where we have to carry out an oft-repeated process of judgment, as in answering the question,

'Who wrote *Hamlet?*' that this active regulative factor drops out, and the process becomes comparatively mechanical.

Synthetic and Analytic Judgments. Logicians distinguish between judgments which combine with the subject notion a new element, as 'iron rusts,' and those which simply unfold a part of what was contained in the subject-notion, that is to say, of the connotation of the term, as 'iron is a material substance'. The first are specially marked off as synthetic judgments, while the second are distinguished as analytic judgments, that is, such as subserve the analytic setting forth of the constituents of the subject-notion.

This distinction which subserves a regulation of the thought-process in conformity with a common standard assumes that we all know the full meaning of our terms, and use them in the same sense. The psychologist, however, who is interested, not in the normal regulation of thought according to an objective standard, but in the growth of such thought in the individual mind, uses the terms analytical and synthetical with reference to the individual's previous knowledge. According to this view, a judgment is (psychologically) analytical when it sets explicitly forth some element in a pre-existing idea, synthetical when it adds to this idea.

Using the terms in this sense, we may say that our judgments illustrate partly the one, partly the other process. Thus general ideas are first formed as an undistinguished complex of marks, and only become distinct or precise as the result of successive analyses. In this sense the first distinct separating out of a quality, *e.g.*, the colour of an orange ('The orange is yellow') may be called an analytical judgment. Again, since all comparison involves analysis, every judgment of likeness and difference may be said to be, under one aspect, an analytical process. Thus if I say that this fruit is a melon, this man is not (*i.e.*, differs from) a Hindoo, it must be because in the given presentation I single out analytically a certain group of marks on the ground of which I refer it to, or exclude it from, a particular class. On the other hand, all advance in knowledge illustrates the synthetic

function of judgment. Thus in the development of our concepts we go on to observe new, *i.e.*, as yet unobserved, features or marks, and join these by a synthetic process to previously observed marks. In this way our notions of things, *e.g.*, the group of qualities which constitute a mineral, a plant, become more complex. Synthesis thus supplements analysis in the formation of our ideas of things.

Judgment and Belief. Our examination into the synthetic process of judgment has disclosed the fact that every judgment involves a psychical element which is best marked off as belief To judge that sugar is sweet, that Peter is like John, that the wind causes waves, and so forth, is to express our belief or conviction that the relation holds of the objective things or realities.

The presence of belief may be made the test of a genuine act of judgment. Thus, if ideas are brought together by the capricious movements of fancy, as in idle reverie, and no belief accompanies the juxtaposition, there is, properly speaking, no judgment. Similarly, of course, if we repeat mere hearsay, of the truth of which we have no individual conviction, or, worse still, state that which we know to be uncertain or even untrue.

The psychological nature of belief is a matter of peculiar difficulty. Since, moreover, belief includes a reference to reality, the discussion of its precise character will come better presently when we consider the psychical aspects of cognition or apprehension of reality.

Affirmation and Negation: Belief and Disbelief. Closely connected with the problem of belief is the distinction between Affirmation and Negation. In the preceding account of the synthetic process in judgment we have supposed that the mind is engaged in establishing a connexion, *i.e.*, in positive affirmation. Thus, to think the connexion snow-white in the proposition "Snow is white" is obviously to affirm the existence of this particular relation. The ideas snow and white are in this case conjoined, and firmly held together by means of the relation here thought of. Hence we speak of the psychical process as one of combination or synthesis.

If, on the other hand, I say "This snow is not perfectly white," the process of combination is wanting. The two ideas are not brought into the relation required for the synthesis 'Snow is white'. They refuse to cohere as parts of a stable thought-synthesis. The relation suggested is, in this case, rejected by the mind, and we are said to negate or deny the corresponding affirmative proposition.

It appears to follow that, psychologically, affirmation is prior to negation. And observation bears out this conclusion. The child affirms before it denies. In the case of one child whom the present writer observed, who was fairly quick in using language, a negative statement was first noted some time on in the third year. Children's negations are called forth partly by disappointment of expectation, as in noting the absence of a person customarily present (*e.g.*, 'Sister not here'), partly through the suggestions of other persons.

When we deny, we express the mental state of disbelief or the complete exclusion of the state of acceptance or belief. Here there is no uncertainty, but the mind is satisfied, or convinced, just as in affirmation. The difference between belief and disbelief is thus a logical difference rather than a psychological one. In saying 'This fruit is not ripe' I am, it is true, rejecting the proposition, 'This fruit is ripe,' but I am still in a state of belief with respect to what logicians call its contradictory.

It follows from this relation of belief to disbelief that judgment is always, more or less consciously, a process of *selective decision.* In judging that this fruit is ripe I am choosing one of two alternatives: 'This fruit is either ripe or not ripe'. That this is so is borne out by observations of the first implicit judgments of children. Thus, for example, it was observed that a little boy, when in his third year he began to use the negative form, did so by appending the negative particle to a kind of self framed question, thus: "A (his name for himself) go in water no". It was further observed in the case of this child and of his sister that about the same age they habitually coupled affirmative and negative statements, thus: "This I's (my) cup, not mamma's

cup"; "This a nice bow-wow, not a nasty bow-wow". The very history of the word judge, indeed, referring as it primarily does to the judicial function, *i.e.*, the deciding of a dispute, shows how prominent an element is this decision in the popular conception of the process.[1]

Suspension of Judgment: Doubt. The situation just dealt with, *viz.*, the having to choose between two contradictory statements, gives rise to a psychical phenomenon of great importance, that known as Doubt or Uncertainty. To reflect, for example, whether or not this coin is a genuine antique is, for the moment, to be uncertain. All careful consideration of a point raised thus involves at least a momentary doubt. Doubt, in its fuller and more intense form, appears when the mind remains uncertain after reflexion, and as the result of a full reinstatement of considerations for and against a point. Such doubt means a pulling of the mind in two directions, that is, a state of discord or conflict due to the action of two incompatible and antagonistic thought-tendencies (forces of association). In this case, it is evident, judgment is altogether arrested or suspended. It is this state of doubt or uncertainty, and not that of disbelief, which is the proper psychological opposite of belief. In belief the mind is at rest, the impulse to inquire is satisfied, whereas in doubt, as the etymology of the word (*dubio*, from *duo*) suggests, we are in a divided state, that is, one of conflict, or baffled activity.

From this slight account of the state of doubt we shall expect it to appear much later in the development of intelligence than belief. Belief is primitive and natural, doubt acquired and artificial. Doubt is more complex than belief, depending on a recognition of a number of opposing considerations. Hence a child will much more readily believe or disbelieve than doubt. Doubt arises, in the first place, only where conflicting facts present themselves in such a way that the child can hardly fail to note them, *e.g.*, in seeing a favourite fruit and at the same time

[1] The idea of choosing or picking out one of two alternatives is still more plainly seen in the Greek term κρίνω (whence κρίτης). *Cf.* the German *ur-theilen*.

the signs of rottenness. Hence it only fills a considerable place in our intellectual life as memory develops and the complexities and apparent contradictions of things bringing disappointment of expectation come into view and are carefully attended to.

REASONING.

Transition from Judgment to Reasoning. Hitherto we have been considering judgments, so far as this was possible, without any reference to the question whether we reach them directly and independently of any process of inference or reasoning from previous judgments, or indirectly by way of such a process. This distinction of 'intuitive' and reasoned judgments is a much more important one from a logical, than from a psychological point of view. Many judgments, which appear to be directly based on observation or memory, *e.g.*, 'This is a fossil,' 'I read A's book when it came out,' will be found to contain an element of inference; on the other hand, a good many judgments which can be grounded on other judgments are not, in the first place, reached by way of these. Nevertheless, the difference does roughly answer to a psychological distinction. For whenever a process of inference precedes judgment the psychical process is by this circumstance rendered a more complex one. This applies, for example, to all predictions suggested by like remembered experiences.

It is to be remarked that there is much the same relation between judgment and inference or reasoning as we found to hold between conception and judgment. Our first judgments are intuitive, the element of inference present being implicit only and not distinctly realised in thought. As intelligence develops, and thought grows more explicit, the differentiation of intuitive and reasoned judgment becomes clearer. When this stage is reached the inferred judgment is consciously based on some previous judgment. *E.g.*, 'This picture is a Sir Joshua because it has such and such marks'. On the other hand, all judgments thus reached by a conscious process of reasoning are capable of becoming in their turn starting-points or premises in further processes of reasoning.

The Mental Process in Reasoning. To reason implies an intellectual movement, a progressive transition from one piece of knowledge to another. It implies, too, that the mind accepts or believes in the conclusion thus reached through or by means of the premises. In other words, the resulting belief is in this case due to a recognition of a logical or 'illative' relation between the new and the old judgment.

In order to ascertain what this relation is let us take a simple example of inference from child-life. A boy of two sees the steam coming out of his food and infers that it will burn him. Supposing the child to draw this conclusion with full reflective consciousness, he may be said to go through the following steps. He first identifies the presentation, rising steam, with a past like presentation or presentations, *viz.*, the appearance of the steam on former occasions. If he had never had any experience like this of the rising steam, he could, it is evident, carry out no process of reasoning in this case. But, in the second place, in thus assimilating a present presentation to previous ones, he goes beyond this particular experience altogether, and, using it as a mark, infers another and heterogeneous experience, *viz.*, that of the common and tactual sensations involved in a burnt mouth. In other words, *the identification of a presentation carries the child on by a process of contiguous suggestion to the representation of one of its most interesting and impressive concomitants.*

From the examination of this simple example of reasoning, *viz.*, inferential expectation, we see that it is compounded of an assimilative process and one of associative integration. It differs, however, from the process of associative reproduction described above, since the mind does not specially recall and fix its attention on the past experience as such, but passes on in the attitude of expectation to the idea of a recurrence of this experience in the present case.[1]

[1] Reasoning, like judgment, is at once analysis and synthesis. Its analytical character is seen in the selection of the point or points of similarity in the new cases. Its synthetic character is seen in the fact that like mere judgment it always establishes a relation ; the establishment being here indirect or 'mediate,' *i.e.*, by help of a pre-existing synthesis.

While reasoning is thus in the main an illustration of the two intellective functions, assimilation and association, it includes also, though in a less obvious way, the third function, discrimination. The detection of difference does not, indeed, constitute the fundamental part of the process as the detection of similarity does. A mere discovery of a difference carries us no further. Thus we cannot infer from the fact that A is not B that A is wanting in the concomitants of B. The identification of a common element is thus the essential preliminary in reasoning. At the same time, the noting of differences is an important auxiliary to it. By a discrimination of things we see where resemblance ends, what is the exact extent of the similarity disclosed, and so grow cautious and exact in our reasoning. Thus, by noting the visible difference between a scented violet and a dog violet we check the impulse to expect the sweet odour when we see the latter. From which it appears that it is the power of detecting resemblances that makes a man ready in reasoning: whereas it is a fine perception of differences which characterises the cautious critical reasoner.

We see from the above example of reasoning that the common supposition of logicians, *viz*., that the mind starts with some known fact or truth as a premise, does not describe the process which actually takes place. To begin with, in ordinary every-day reasoning *the conclusion presents itself first*. In many cases the grounds or premises of this conclusion do not become distinct in consciousness at all; and when they do, it is rather as an afterthought when the conclusion reached is challenged by one's own mind or by another's words. Here again we must be on our guard against taking the logician's account of how our processes of thought may be carried on as representing faithfully the manner in which they actually take place in ordinary cases.

Implicit Reasoning. The process of inference from premise to conclusion, known to inferred fact, may assume one of two well-marked forms. In the first place, we may, as in the above instance, pass directly from one or more singular judgments to another singular judgment without clearly setting forth to our minds the ground of our conclusion *under the form of a general*

truth or principle. Thus a boy having observed on one or more past occasions that a piece of wood floats in water will conclude directly in a new instance that a particular piece will float. This imperfect mode of inferring from premises has been called reasoning from particulars, and may be marked off as Implicit reasoning, because, although a basis of inference is apprehended under the form of a previous like experience, this is not clearly thought out into the form of a general ground or universal principle.

This form of reasoning is the simplest and earliest in the order of mental development. The reasoning of the lower animals, when it is a conscious transition from something already known, as in avoiding a snare after experience of its unpleasantness, must be supposed to assume this form. Most of the reasoning of children is of this kind too, as when they infer, by analogy (as it is loosely called), from the beneficial or hurtful qualities of one thing to those of another similar thing, from one person's manner of treating them to another's. In all these inferences the mind passes from one or more old experiences, some or all of which are distinctly recalled according to circumstances, to new ones without seizing the general rule or principle involved in the procedure. And even adults in the large number of their every-day practical conclusions reason in the same way.

Practical Judgment: Tact. Closely connected with the crude form of reasoning so far considered, *viz.*, direct transition to conclusion without distinct apprehension of any ground, and transition with apprehension only of a particular analogous case, is what is variously known as practical judgment, sagacity, or tact. By this is meant the power of rapidly and only half-consciously adapting previous experiences to new cases without a clear representation of the experiences thus adapted. Such a sub-conscious type of adaptive inference is apt to show itself wherever the marks from which we conclude are numerous, or obscure and difficult to seize, *e.g.*, in judging of a person's age, or when the new case is materially different from known cases, and could not easily be exhibited as a parallel case, still less as an instance of a general rule, *e.g.*, in judging of a person's fitness for a new office. These practical inferences are, to a large extent, the working out of an organised associative tendency to think a particular kind of connexion,

e.g., such a plan will succeed, such a person is untrustworthy. The intellective process is here largely automatic, and has a close analogy to action under the impulse of habit, a phenomenon to be considered by and-by.

Explicit or Logical Reasoning. It is evident from our illustration of the process of implicit reasoning, or reasoning from particular instances, that it does virtually assume a general truth. Thus if the boy in our example were not sure of the universal proposition 'All wood floats,' he would have no adequate logical ground for concluding, 'This piece of wood will float'. And when his reasoning power develops, and he clearly apprehends what is meant by an adequate ground or reason, he will explicitly put forward this universal proposition as his justification. The reasoning may then be said to become explicit, and to take on a distinct logical form. In so far as we reflect on our reasoning operations we naturally tend to bring them into this form. The capability of carrying out such a logical type of reasoning is one of the most important results of the possession of general terms, and thus marks off human reasoning at its best from animal inference.

This full explicit process of reasoning by way of a universal judgment is commonly said to fall into two parts or stages. Of these the first is the process by which the mind passes from a survey of particular observations, *e.g.*, 'This stone sinks in the water,' 'That stone sinks,' and so forth, to the universal judgment, 'All stones sink in water'. This is known as Generalisation, and also in its more cautious form as Induction. The second stage is the proceeding from the universal proposition thus reached to some particular case (or class of cases), *e.g.*, from the universal proposition, 'All stones sink,' to the proposition, 'This stone will sink'. This is known as Deduction. Induction is an upward movement of thought from particular instances to a general truth, principle, or law; deduction, a downward movement from some general statement to a particular statement, or at least a statement less general than the first.

(*a*) **Inductive Reasoning.** The psychological process in

passing from a survey of particulars to a general truth illustrates the essential process of all thinking, the detecting of similarity amid diversity. Let us examine an instance of inductive reasoning. The child observes that his toys, spoons, knives, he himself, and a vast multitude of other objects when not supported fall. He gradually compares these facts one with another and seizes the essential feature in them or the general truth implied in them. He discovers by comparison and analysis that what all these things have in common is that they are material bodies. He then extricates this general conception, and along with it a particular circumstance, *viz.*, falling to the ground, which has invariably accompanied it. That is to say, he judges that all material bodies fall, when not prevented.

The process here briefly described is clearly similar to that of generalisation as entering into conception.[1] In both cases the essential activity of thought is the comparing of a number of single experiences or particulars, and the analytical separating out of some common or like feature or features. Induction differs from conception in the mode of the assimilative unification. In conception we trace out similarities in a number of objects viewed as detached wholes, *e.g.*, particular trees. In induction, on the other hand, we are finding out a general relation between things, or a similarity in the way in which things are conjoined, *e.g.*, the common or general relation of concomitance between material body and the tendency to fall or gravitate.

It is important to add that the process of induction as reasoning involves more than a mere summarising of observed similarities. The universal judgment, 'All bodies gravitate,' is obviously *a movement of thought beyond the limits of observed facts*. Just as in forming a class by help of the general name the mind implicitly comprehends a vast array of individual things not actually observed, so in induction the resulting judgment embraces an

[1] The reader will note the fact that the same word 'generalise' is used so as to cover the two closely related processes, *viz.*, the bringing into a general form (*a*) our observations of objects (conception) and (*b*) our observations of the connexions or relations of objects (induction).

indefinite number of unknown cases along with the known. It is only because it is thus universally comprehensive that it serves its subsequent purpose as a principle of reasoning.

Development of Inductive Process. The generalising or inductive process here spoken of presents itself in a very crude form at first, and only attains to a more perfect form with intellectual development and with the discipline supplied by education Thus, as in the case of conception, there is a gradual movement from relatively concrete generalisations answering to palpable similarities to more abstract generalisations answering to more obscure, and, in general, more widely-distributed similarities. The child, for example, begins to note that some varieties of living things, *e.g.*, flies or birds, die. He then compares these results, and, extracting the common relation, finds his way to the more comprehensive generalisation "All animals die". Later on, he compares this result with what he has observed of flowering and other plants, and so reaches the yet higher and more abstract generalisation "All living things die".

Again, the development of the inductive process involves a transition from impulsive, hasty generalisation to a more reflective and cautious type. At the outset the child is disposed to expect too much similarity in things, and he will often generalise from an absurdly inadequate range of observation, as when he argues that all children, like himself, have a nursery, a rocking-horse, and so forth, or that animals feel and act precisely as he himself does. As experience widens and intelligence advances he begins to note the points of diversity as well as those of uniformity in events, to make a more extended examination of instances, and to take some pains to limit his conclusions, *e.g.*, in saying "*Some* birds eat fruit," "*Most* birds sing," and so forth. In close connexion with the carrying out of this wider examination of examples he makes a closer inspection of the events that present themselves, so as analytically to detect the essential element with which some concomitant is conjoined. Thus, for example, he finds that stinging goes with and is dependent upon the possession of a sting, and so, instead of generalising as at first, "All insects

sting," learns to generalise more thoughtfully, 'Animals with a sting can sting us'.

This development of inductive reasoning shows itself in a much more careful investigation of things with a view to discovering their causes (or their effects). The finding out of the (common) cause of a phenomenon, *e.g.*, of things floating or sinking in water, is one of the main directions of inductive reasoning. The young and the uneducated are characterised by hasty inference in respect of causation, *e.g.*, taking what is the agency in some cases to be the agency in all cases, or what is a mere accidental accompaniment to be a part of the essential conditions, or lastly, a part of the real conditions for the cause, that is, the whole sum of conditions. Here, also, development of reasoning power means a more patient searching out of instances, and a more careful analysis of a complex of circumstances, so as to mark off the essential features on which a result really depends.

(*b*) **Deductive Reasoning.** By induction the child reaches a larger number of general or universal judgments. Having these universal judgments as rules or principles, he is able to pass on to the second stage of explicit reasoning, namely, deduction, or reasoning *from* a general principle. Thus a child who has been told that all persons are liable to make mistakes is apt to apply the truth by arguing that his mother or his governess makes mistakes. The type of deductive reasoning when fully set forth in its logical form is known as a syllogism, of which the following is an example:—

	All M is P.	Everything made by labour costs money.
	S is M.	A toy is made by labour.
Therefore	S is P.	Therefore a toy costs money.

It is evident from this example that deduction, no less than induction, conforms to the common type of reasoning as explained above. That is to say, it is the indirect establishment of a synthesis by help of given syntheses. The process sets out with an analysis of the idea of toy and an assimilation of it under a particular aspect to certain other things, *viz.*, those made by

labour. As a result of this identification the mind then reaches by contiguous suggestion the idea of a new concomitant of the toy, the circumstance of its costing money.

In thus describing the psychological process in deductive reasoning, we must, as in the case of implicit reasoning, distinguish between the logical order required for purposes of proof, and the actual psychological order. In our ordinary every-day deductions we rarely proceed in the formal way here set forth, that is to say, setting out with two antecedently known judgments or premises and passing on to a third judgment as a conclusion. In many cases the conclusion is the first that distinctly presents itself to the mind, and the other judgments rise into distinct consciousness later. In many other cases, moreover, we do not at any stage distinctly think both of the premises logically involved.

Finding Applications and Finding Reasons. Deductive reasoning may begin at one of two ends. In many cases we have a principle given us, and proceed to draw conclusions from it. This is known as the application of a principle, or the discovery of a new illustration of it. Here the mind, taking the principle as a guide, is engaged in seeking out and assimilating new examples among its store of facts Thus, after a child has learnt that it is bodies lighter than water which float on its surface, he proceeds to conclude that the ice which he sees floating is lighter than water, or to deduce some as yet unobserved fact, *e.g.*, that cork, the lightness of which he notes, will float.

In other cases, we set out not with a general truth but with a particular fact, and seek for a principle to which we may assimilate it. This is described as finding a reason for a statement, or as explaining a fact. Here the psychical process is, as in the other case, the search for points of similarity. The difference in this case is that whereas when we start with the general rule we have the essential feature already distinctly set forth, when we set out with the unanalysed particular we have to carry out a fuller process of analysis. Thus a child when asked to say why an action is wrong must, it is obvious, analytically detect the element in the action that brings it under the rule to be recalled.

Reasoning as Activity and as Mechanical Process.

From this brief account of the processes of reasoning the reader will see its close dependence on the earlier intellectual processes, observation and reproduction. In order to carry on a process of reasoning it is necessary that our mind be well stored with facts gained either by personal observation or by instruction. It is further necessary that we have a number of clear concepts and clearly thought judgments with which these facts may be brought into relation. To this must be added facility in construction, in forming new notions and hypotheses.

Nor will all this avail without a considerable development of voluntary attention and the power of concentrating thought on particular ideas and trains of ideas. To reason out a thing frequently implies intense and prolonged activity of mind. Thus, in seeking an explanation of some obscure fact, say the odd conduct of one of our friends, we have to perform an elaborate process of search. In carrying this out we need, from the beginning, to keep steadily in view the object of this search, that is to say, to fix the attention on the particular features of the case which require to be assimilated. We have, further, to single out for special consideration from among all the thoughts called up by the various suggestive tendencies of the moment those which are seen to be analogous to, or to have a bearing on, the case. Thus in the instance supposed we fix our attention on other actions of the same person, or of other persons, on familiar principles of human nature, and so forth, in the hope of finding by the requisite assimilative stroke the key to the puzzle. Not only so, when the process is perfect the will is called on to resist the tendencies to irrelevant thought, and the influence of feeling and bias, which, as we shall see, serve to mislead the mind from the truth. The greater the concentration, the more perfectly the representation of the desired result is fixed by the attention so as to dominate all the mental processes of the time, compelling them to converge on this result, the higher will be the quality of the reasoning.

Such a process of active reasoning attended with effort is, however, only realised occasionally where the conditions are new and complicated. In a large part of our every-day reasoning the effect

of previous practice comes in to shorten the process and to reduce it to some extent to a sub-conscious and mechanical form, that is, to a process in which the volitional factor becomes evanescent. This is an illustration of the principle of Habit already touched on. Such a reduction by practice of the factor of effort and consciousness in general is, as already pointed out, the subjective side of a physiological change, *viz.*, the more perfect organisation of certain central arrangements. In this way the highest processes of the mind are attached to an organic base.

This effect is exhibited most strikingly in the deductive processes of reasoning, since it is in these that *words* play an essential and prominent part. Words, as already hinted, are capable of being used as substitutes for ideas in many of the simpler processes of reasoning. Thus in such forms as the following: "Since A is greater than B, and B than C, therefore A is still greater than C," a mind practised in tracing relations and drawing out conclusions from known truths in which they may be seen to be implicated will run through the stages of the process in a semi-mechanical way. To this it may be added that when the same argument has to be gone through again and again this reduction of the process to an automatic form becomes still more marked. This is owing to the effect of repetition of an ideo-verbal series in reducing the individual links in the chain to a fugitive and indistinct form (*cf.* p. 186).

Logical Control of Thought-Processes. The regulation of the reasoning processes by logic is carried out by developing the functional activities of thought to a more explicit or reflective mode of elaboration and expression. Thus, in the rules by which the formal correctness of the judgment is secured—*viz.*, the choice of perfectly clear and unambiguous terms, the bringing out of the quality and quantity of the judgment, together with a clear realisation of all that is involved in the proposition, excluded by it, or left doubtful by it—logic compels the thinker to bring into clear consciousness all that he is implicitly thinking in the particular case. Similarly with respect to the syllogistic rules drawn up in order to secure formal correctness in the reasoning process. They

aid us by enabling us to arrange our thoughts in such a way that we can fully realise all the implied relations.

With respect to material correctness, that is, the correspondence between thought and real fact, logical control seeks to secure its result by insisting on a more exact and scientific form of observation, *e.g.*, that secured by an experiment carried out amid known conditions, and by supplying certain rules of induction, which may aid us in seeing where a cause is certainly known, and a theory proved. Here, again, the regulated type of procedure consists, as already hinted, merely in carrying out the first crude spontaneous thought-operation in a more prolonged, patient, and cautious manner.

The whole art of correct reasoning addresses itself indeed to the formation of habits of *volitional control.* In order to improve ourselves or others in carrying out these processes readily and correctly, what we should aim at is the formation of a firm disposition to take pains. That is to say, the discipline of the reasoning powers consists in training the will so that it may check the promptings of prejudice, and of hasty suggestion, look below words into their hidden meanings, and resolutely confront statement with real fact. The true disciplinary value of logic resides in the circumstance that it lays the foundation of these valuable mental habits by accustoming the student to a careful revisionary examination of his reasoning processes in the light of definite rules.

Self-Consciousness.

Development of Idea of Self. In the above account of the thought-processes we have been concerned with ideas of outer things, with perceptual and conceptual knowledge of the external world In addition to our common cognition of an external world or macrocosm, there is each individual's cognition of his inner world or microcosm, and we have now to examine into the psychological development of this idea or consciousness of self. Self-knowledge, it is to be observed, though in its higher forms more abstract and difficult to attain than knowledge of

outer things, is, as we shall see, developed along with this, and is indeed to some extent involved in a fully explicit logical thought about the world. It is only taken up at this late stage for the purpose of simplifying the exposition of the subject.

(*a*) **The Pictorial or Bodily Self.** As pointed out above, the first crude idea of a self arises in the child's mind in connexion with the perception of his own organism. This is from the outset known as an object different from external objects, partly by its continuous presentation, and still more by its intimate connexion with his painful and pleasurable sensations. It is only gradually that he attains to this first differentiation of the self from the not-self. Thus it has been observed by Preyer that his boy when more than a year old bit his own arm just as though it had been a foreign object. This first stage of self-representation, in which self is the ever-present body that feels, seems to correspond roughly at least to the early period of life in which the child speaks of himself by his proper name. In this crude idea of self, before the meaning of "I" becomes clear, we have to suppose that the child does not fully realise the opposition of self and not-self, but rather tends to regard himself as a kind of thing after the analogy of other objects.

(*b*) **The Inner or Mental Self.** This pictorial representation of the body remains an integral part of the idea of self throughout its development, forming, indeed, its fixed presentative base. The next stage in the development of the idea of the ego is the separation of an inner or mental self from the body. The child is led on to this by a closer attention to his pleasurable and painful sensations, more particularly the organic sensations, with their preponderant accompaniment of feeling, which play so prominent a part in early life, and which are known to constitute the organic basis of the later self-consciousness. As he learns to abstract from outer things and attend to his sensations, his desires, and his actions, he begins to form a dim conception of an inner self. His power of doing things *when he wishes* would be among the most interesting of the manifestations of this self, and among the first to attract his attention.

This idea of an inner self would not, however, attain any great clearness until the development of the life of ideation, as distinguished from the observation of external things, had reached a certain point. It is only when this inner representative life is sufficiently strong and coherent to assert itself against the more powerful stimuli of sense, and when as a consequence of this the child begins to realise the difference between imagining and actually perceiving, that he is able to demarcate the self from the not-self.

This attainment of an idea of a self is greatly aided by language. The fact that the child is always addressed by one and the same name has a powerful effect in impressing on his mind the fact of his individuality. Still more effective is the use of the second person, you (or thou), in bringing home to him this idea of himself. By the use of such language, as in condoling with the child when hurt, in inquiring as to his feelings, in asking him whether he wishes to do something, and so forth, his companions have a very powerful means of directing his attention to his inner states.

As the history of the race and of the individual tells us, the first conception of an inner self is materialistic, showing that the objective attitude of thought is still predominant. The inner self of the savage and of the child is a *quasi*-material thing resident in a definite part of the body, and more particularly the breast. This materialistic conception gives way to a more spiritualistic one, as the power of reflexion, *i.e.*, isolating attention to psychical states, is developed. How difficult this is in early life is known to all who have to do with the young. In the case more particularly of lively and vigorous children absorbed in outer things, and full of active pursuits, the reflexion demands a severe effort. Want of outer interest, on the other hand, driving thought in on itself, as in the case of many a morbid, dreamy child, may expedite the process of self-reflexion. A clearer consciousness of self as the feeling, thinking, desiring subject is greatly aided by the action of the social environment, as brought to bear, for example, in the processes of moral correction.

(*c*) **Idea of Self as Enduring: Personal Identity.** All reflexion on self and its states is a kind of retrospection. The full consciousness of self as a unity, that is, a permanent subject, only arises as the power of reproduction develops. It is by retracing past experiences, and apprehending them as a succession in the way explained above, that the fuller realisation of the idea of self emerges. Here, again, the material base continues to furnish a bond of unity. The constant presentative complex, 'my body,' with its relatively fixed accompaniment of organic sensation, serves as a material nucleus about which the remembered experiences group themselves as parts of a single life. That this is so is seen in the effects of any sudden changes in the bodily factors, as in the sense of changed personality which accompanies the changes in the appearance of the body and of the mass of organic sensations brought about by illness.

This co-ordination of successive experiences, recalled by the reproductive process, into the unity of the permanent self, is never carried out as perfectly as is commonly represented. Not to speak of such obstacles to the realisation of continuity as the periodic interruptions of sleep and illnesses, we may observe that the lapse of years, by effacing a large part of our memories, renders anything like a complete realisation of identity impossible. Not only so, this flux of time brings about profound changes in our tastes, aims, and so forth, and in this way serves to arrest the endeavour to identify our present with our past self. We are the "same" as we were when children more through the assurances of others than through our own recollective consciousness.

A final stage in the development of self knowledge is the attainment of a consciousness of a personality, that is, an individual character with certain (relatively permanent) intellectual and moral attributes. The development of this cognition evidently presupposes the highest exercise of abstract thought. The history of language tells us that at first the mind can only form an idea of a mental or moral quality, as sagacity, courage, by reference to some related *material* process, such as the bodily movement which accompanies and expresses the quality. In these first

attempts to deal with the mental, analogy plays a prominent part. Thus the deaf-mute Laura Bridgman, already referred to, got at her first idea of the distinctions amiable and unamiable by associating each with the analogous effect of feeling in the region of sensation, *viz.*, a sweet and a sour apple. A full, clear apprehension of such intellectual and moral qualities implies that we not merely 'abstract' in the sense of withdrawing attention from sense-presentations and fixing them on inner states, but 'abstract' in the sense of comparing many remembered mental processes so as to discover their common aspect. The clear self-knowledge growing out of these processes is one of the rarest of attainments.

Notions of Others. In close connexion with the growth of the idea of self there is developed that of others like "myself," having feelings and thoughts as I have them. In this way knowledge of things becomes completed by the apprehension of a world of sentient and conscious beings.

The first crude consciousness of self, both in the child and in the race, appears to be that of one among a number of like beings. The animal and the child no doubt each distinguishes his own body from other like bodies by reason of the differencing marks already spoken of. Yet, from the first, there seems to be an impulse to endow other bodies similar to his own with an analogue of his sensations. In the instinctive sympathy of animals, in the infant's responsive smile, we see an interpretation of others' manifestations of feeling which precedes all definite reflective self-consciousness. At this stage there is rather a vague consciousness of self and others, or of self among others, than a differenced consciousness of self and of others.

It is to be added that this primitive impulse to project sensation into external bodies extends beyond the limits of the species and of the animal world, embracing plants and even inorganic bodies. This is abundantly illustrated in that far-reaching personification of inanimate objects, that anthropomorphic way of conceiving of nature and its processes, which meets us in what remains of primitive mythologies, and which is

mirrored in the closely analogous systems of nursery-lore (*cf.* above, p. 235).

As intelligence develops this first crude thought about the world gives place to a more exact conception. The differences between things are noted by the child, *e.g.*, "me" and the grown-up person, 'me' and the animal, men and animals, and so forth. The attribution of sentient life to other things takes on here more of the character of a consciously inferential process. The child now recognises definite marks of sensation, inferring the existence of the sensation when the marks are present, and refraining from doing so when they are absent. In this way it gradually reaches a view of the world as made up of grades of existence, as the not-living and the living, the animal and the man.

It is to be added that the knowledge of others stands in intimate connexion with that of self. On the one hand, as we just now saw, it is attention to others' thought of us as expressed in words which often leads us to reflect on our own minds. On the other hand, a closer attention to our own mental states enables us to understand others better: we know mankind through self-study.

INTELLECTION AS KNOWLEDGE.

Cognition of Reality: Belief. We have now carried the examination of the process of intellection far enough to consider it in its relation to its object, in other words, to view our thought under a new aspect, *viz.*, as the cognition of something real, *i.e.*, Knowledge. Here, however, we shall be concerned not with the philosophical question, What is reality? but with the psychical characters which enter into and distinguish the *consciousness* of reality.

If now we consider thought under this aspect, we find its most essential and characteristic element to be *belief*. To know a thing as actually existent, to apprehend an object as real, is to be in the state of belief or assurance, belief being here understood to include the higher as well as the lower degrees of assurance.

Nature of Belief. The precise psychological nature of

belief is, to some extent, a matter of dispute. Most writers regard it as an intellectual phenomenon. It is evident that it has an intellectual aspect. Belief being realisation of an idea, *i.e.*, apprehension of reality, in some form and with some degree of strength, it follows that it is in one important respect a manifestation of intellect. Viewed in this way the term belief serves to mark off the objective attitude of ideation or thought, or, in other words, the fact of its representativeness. When I think, for example, of gold, I represent the thing gold as really existent, and as having such and such properties.

At the same time, as pointed out above, belief involves an element of feeling: when we believe we are satisfied or at rest. Hence the common forms of speech: "I feel sure," and more elliptically: "I feel it must be true".

Lastly, it is recognised that belief stands in a close and organic connexion with conation or action. To believe is to be ready to act Thus to be satisfied that the weather is changing, that a man is honest, and so forth, is to be prepared to act on the assurance. Here, indeed, we may easily see that the state of assurance is immediately attended with nascent promptings to act, *e.g.*, to walk out, to trust the man. This forward aspect of belief, as readiness to act, is especially manifest in all forms of expectation.

Belief being thus a compound of three factors --intellectual representation, feeling, and active impulse—a complete account of the genesis of belief would include an examination into each of these constituents. Since, however, we have not yet examined into the workings of feeling and conation, we must at this stage dwell mainly on the intellectual factor in belief, merely indicating by way of anticipation how the other influences complicate the process.

I. Intellectual Conditions of Belief: (*a*) Belief and Ideation. The primal source of belief lies in the relation of representative ideation to actual presentation. We assume here that what we call the real is presented in sense-perception, that when we speak of a real object we refer to the experience of direct

sensuous apprehension, and more particularly that of sight and touch (*cf.* chap. vii.). Now we have seen that our mental images are derived from and representative of percepts. Hence to imagine is to represent an object actually existing, as we should apprehend it in sense-perception. This reference in ideation to the immediate grasp of reality in perception is specially manifest in the reproductive processes, in which the revival of an image is at once attended with what we call recognition or remembrance, that is, the recalling of a past percept as past.

This same implication of belief in ideation is seen in the freer processes of imagination. Hume drew a sharp distinction between merely imagining and believing. We may picture a centaur or a hobgoblin without believing in its actual existence. Yet all imagination, just because it is only a further product of perceptual experience, carries with it a tendency to momentary belief. And if only the image is vivid and sufficiently coherent and stable, it assumes the form of a representation of a reality, that is to say, of an object existent in the external world. This tendency to give reality to images is abundantly illustrated in the beliefs of the savage and the child in the existence of supernatural beings. It is further illustrated in the fact that Dickens and other novelists have, through a vivid and protracted imagination of their characters, been subject for a time to a firm persuasion of their real existence.

The belief here referred to is vague and inchoate only. The reality more or less distinctly apprehended is not placed in a world of connected parts in space and time. The naive fancy of the savage and the child, at its best, localises its supernatural fictions in remote space and remote time, *e.g.*, in prefacing a story with the words: "Long, long ago," "Far, far away". Such belief, moreover, is in normal circumstances momentary only, being immediately corrected by reflexion. This is illustrated in the way in which the child arrests and corrects the illusory tendency to believe in its doll as alive, as when like the savage it is overtaken with a sceptical revulsion and dashes its idol to the ground. We have now to pass to a more definite form of belief:

that which accompanies the complete process of synthetic thought or judgment, and depends upon an associative connexion of ideas.

(*b*) **Experience and Association.** It is commonly admitted that the great source of all definite connective belief is experience and association. Reality is given us in our common sense-experience as a tissue of connected parts, *e.g.*, qualities conjoined in things, a succession of connected changes in things. These connexions in our presentative experience determine by the processes of association the order of our representations. We may say, then, that all belief tends to take on the form of an apprehension of an objective connexion or relation, which relation is suggested by a process of reproduction.

As pointed out above, the process of contiguous association is that by which the order of our ideas is assimilated to that of our perceptual experience. Hence contiguity is the main intellectual factor in belief. To realise an idea by setting it in definite relations of space and time is only possible through the workings of contiguous association. This was illustrated above in the case both of memory and of expectation.

Both memory and expectation have to do with the actual present as their starting-point. Now we have seen that belief in reality has reference to an actual perceptual experience. We may thus say that both the recollection of a thing and the anticipation of a thing as a mode of assurance are effected through the connexion of an idea with the actual presentation of the moment. And the closer this connexion, the stronger is the belief. Our confidence in that which has just been experienced is of the very strongest; and, as we shall see presently, the same applies to that which is suggested by the present as immediately about to happen. The effect of actual objects in aiding belief in the images immediately associated with these, as illustrated in the service of a ground-work of sense-reality, *e.g.*, a toy, to the fiction-building of children, as also in the value of religious symbols in furthering a realisation of the unseen, and of personal relics as helping us to recall the reality of the past, is due to this circumstance.

In the case of expectations we have the phenomenon of inferred or inferential belief. This, as implied in what has gone before, depends on the firm establishment by means of certain given

presentations or representations of a particular ideational connexion or structure. Thus, in inferring from known instances of thunderstorms that another thunderstorm is coming on, my new inferential belief arises through the inevitable reinstatement of a particular expectation by a given group of recollections.

It follows from this view that the strength or intensity of such an inferred expectation will depend on the vividness and stability of the reinstated ideational connexion. Thus it is strengthened by all that tends to secure vivid reinstatement, as the exciting character of the original impression. For a like reason, the expectation of an event which stands in close temporal proximity to the actual present, being more vivid than that of a remote consequent, will be attended with a stronger or more lively assurance.

Next to such conditions of vivid reproduction we have the great force of repetition. We have seen that the strength of association varies (*cæteris paribus*) with the amount of repetition, and with the degree of uniformity of the connexion. This effect of repetition and uniformity is seen in *the stability of all thought-connexions which answer to recurring and invariable conjunctions*, *e.g.*, signs with their significates, causes with their effects, and so forth. And it is here that we see inferential belief at its strongest. Thus we have the fullest assurance that sea-water is salt, that rough and hard substances hurt, and so forth.

Verbal Suggestion. Closely connected with the effect of experience and contiguous association on belief is that of verbal suggestion. The instant excitation of a more or less distinct belief by another's word, *e.g.*, when a man shouts 'Fire!' illustrates the force of words in reinstating vivid ideas. The peculiarly close connexion of words and ideas is, as already pointed out, the effect of great frequency and perfect uniformity of associative conjunction. To this it must be added that every connected form of words or verbal statement presents itself to us as the direct expression of another's judgment and conviction. Hence the tendency to accept another's statement automatically and quite apart from any process of 'weighing testimony'. The

combination of words in this case serves to effect in the hearer's (or reader's) mind the corresponding combination of ideas, and so to excite a nascent belief in the reality. We see this effect of verbal suggestion in the common superstition that to talk of death or other calamity is to invite its occurrence, as also in the tame acceptance of traditional statements which the least reflexion would show to be untrue, and in the momentary tendency to believe even what we half discern to be an extravagant assertion.

II. **Effect of Feeling on Belief.** While belief is thus in the main the product of the intellectual mechanism, it is powerfully affected by the feelings and desires. There is no such thing as a perfectly cold belief into which no feeling enters. We must be interested in a truth if we are to give it our full conviction. Our strongest beliefs are those which connect themselves closely with self and its interests. The immense influence of this affective element in belief is illustrated in the way in which it tends to counteract or overpower the intellectual tendencies. In the unregulated beliefs of the uneducated this setting aside of thought by feeling is habitual. Thus, in the superstitious beliefs of the savage in the reality of that which strikes the imagination and awakens fear, in the tendency of the vulgar to believe in the miraculous, in the impulse which we all experience to believe that which we wish for, and in all that is known as prejudice and bias, we see illustrations of this disturbing influence of feeling.

This action of feeling on belief is in every case mediate; that is to say, it works *by modifying the processes of ideation themselves*. It is by giving preternatural vividness and stability to certain members of the ideational train called up at the time, *e.g.*, ideas of occurrences which we intensely long for, or specially dread, and by determining the order of ideation to follow not that of experience but that which answers to and tends to sustain and prolong the feeling, that its force serves to warp belief, causing it to deviate from the intellectual or reasonable type.

It follows that when belief is thus sustained by feeling the decline of feeling will tend to undermine the belief. This result is seen in the occasional lapse of religious and other beliefs

through the cooling of emotional fervour. The imagination, wanting its emotive stimulus, fails to rise to the needed point of vividness. The mind loses its hold on the reality and falls into a depressed state of doubt. Certain organic disturbances bringing about a lowering of feeling are known to diminish the firmness of mental grasp, an effect which in extreme and morbid cases may reach to a loss of the sense of reality even with respect to objects which are directly perceived by the senses.

III. Belief and Activity. As was observed just now, belief stands in a peculiarly close relation to activity. In most cases at any rate it involves the incipient excitation of impulses to look out for a particular result, and to follow a particular line of action.

Owing to this organic connexion with action, belief may be influenced by strengthening the active element. Thus, as we all know, an eagerness to do something tends to favour the belief that would justify us in doing it, *e.g.*, our power to accomplish our purpose, the rightness of the action, the worthiness of the object, and so forth. Hence in the case of the young, who are characterised by great strength of active impulse, belief is generally *in excess of the teachings of experience.*[1] Doubt and hesitation, on the other hand, only arise where these impulses are in a measure toned down by the lessons of experience. The contrast which thus shows itself in the case of eager youth and cautious age discloses itself in a less marked way in the case of the practical and the speculative mind. The former, strongly urged by his active impulses to act and therefore to decide somehow, is impatient of uncertainty and only happy when he has a definite and strong conviction ; the latter may be said to live in an atmosphere of uncertainty, and in extreme cases, as that of Coleridge, where ideation is wholly divorced from practical impulse, hardly to know what full intense conviction means.

Logical Control of Belief: Knowledge. In the foregoing account of the several factors in belief we have been occu-

[1] Dr. Bain calls this early tendency to believe in advance of experience 'primitive credulity'.

pied merely with its primitive or instinctive form. We have now to see how the process of logical thought serves to transform this crude type of belief into that reasoned or systematised form which we call knowledge.

As we have seen, logical, that is, fully explicit thought, proceeds by clearly setting forth our judgments in a verbal form, and in tracing out their logical relations, consistency and inconsistency, and dependence of conclusion on premise. The expression of a belief in a definite propositional form is itself an important step in the direction of reflective or rational conviction; for the belief when thus expressed is in a manner objectified, *i.e.*, thrown into the form of an object which calls our own attention to itself as well as invites the critical inspection of others.

A yet more important step is taken in the logical organisation of belief when thought explicitly assumes a general form, that is to say, proceeds by way of a universal proposition. When, for example, the child first begins to realise the universal truth that all living things die, his belief in the fact of death undergoes, through the very apprehension of the truth as universal, a considerable increase both in respect of extent or range of object and in respect of intensity or certainty. By the systematising of such universal propositions in what is known as Science our beliefs attain a certain degree of systematic co-ordination or organisation into a consistent and compact structure.

In this organisation of a stable structure belief does not change its nature, but only its form. Reality is still determined by the direct presentations of sense. And the observations of sense, when scrutinised and reduced to pure observations and otherwise rendered exact by scientific method, remain the ultimate test of all theory. Thus belief in its most speculative flights is always harking back for its verifying resting-place to the lowly but firm territory of sense-perception.

The transformation of primitive belief by this rationalising process of thought is seen in a striking way in the change it effects in the original disposition to believe, to accept statements as true. The primitive mind is credulous: it casts itself confidently on the

first suggestion of the moment. Thus the mere hint that something is going to happen induces expectation. The development of experience and thought tends to substitute a more cautious, critical attitude for this credulous one. Through the disappointment of expectation and the contradictions of life there is developed in the thoughtful man a slowness to believe. This cautious attitude shows itself in what we commonly describe as a man of "judgment". Much the same result is seen in the effect of scientific discipline. The investigator into nature's processes has in his pre-existent knowledge a criterion by which he judges of the truth of any new theory, and he is disposed to accept only that which harmonises with, and can be taken up into the structure of, this pre-existent knowledge.

Knowledge as Social Product: The Common Mind. Along with this co-ordination of partial knowledges into a total organised knowledge there goes another process, *viz.*, the logical adjustment of individual to common beliefs. What is meant by knowledge in its complete sense as apprehension of reality always has reference to such a community of intelligences, or a system of individual minds capable of comparing their ideas one with another, and so developing them into the form of common cognitions. This mutual adjustment of personal belief into a system of common cognition is carried out by the mechanism of language.

We see this sociality of knowledge in the simplest form of apprehension of reality, *viz.*, sense perception. The objective character of an individual's percept, say the visual apprehension of a star, involves the agreement of his percept with that of others under similar conditions of place, time, etc. Whatever else 'the real world' may mean, it certainly includes the fact of a common sense-experience. Hence it is only as the child's consciousness of itself in its solidarity with others grows clear that it clearly apprehends the external world as real or objective.

Much the same thing is observable in the later forms of belief which accompany the development of ideation and logical thought. Thus, in the process of reproducing past experiences, we compare our recollections with those of others who have taken part in them,

and so acquire a much firmer grasp of the reality recalled In general or conceptual thought, again, a like process of social adjustment is carried out. Thus the very employment of a common language has for its purpose to bring the concepts of each into agreement with those of others: and this process of social adjustment is perfected by a more precise fixing of the conceptual standard through logical definition. Similarly with propositions. The embodiment of our belie in a propositional form is the means by which it enters into that organic structure which we call common knowledge.

The process of socialising belief or assimilating it to a common type leads on to the solidification of a mass of generally accepted propositions in the form of *quasi*-intuitions, that is, independent or self-evident convictions. The processes by which these common beliefs were reached come in time to be forgotten, and they take on the appearance of original or intuitive beliefs. Thus the generally accepted principle that changes are brought about by causal agency has long since taken its place, with the more thoughtful at least, in this firm substratum of common cognition. In addition to the principles which underlie speculative thought, there are others which lie at the base of practical thought, *e.g.*, the belief that life is good, that it is right in general to pursue our own interest, and so forth. In these fundamental convictions, which have been named by certain philosophers Common Sense, we see the most striking example of the solidification of a common type of belief.

Authority and Individuality in Belief. This mass of consolidated belief works as a powerful influence on the development of the individual mind. It is highly probable that in the case of the more fundamental part, or at least that which has been longest fixed, the individual inherits in the constitution of his brain a disposition to take on these particular forms of 'intuitive' belief. However this be, the forces of tradition, including all that is meant by instruction, are a powerful agency for assimilating individual belief to the common type. If we bear in mind the supremacy of this agency in early life, when most of the individual's convictions are acquired, we may easily see how much

tradition has to do with the formation of the beliefs of each one of us.

The conscious action of the community on the individual through the traditional agencies of instruction gives rise to what is known as the claims of authority. Thus, in science, in morals, and in religion, we see the tendency on the part of the community or the majority to require the individual to conform his beliefs to the common standard.

With the precise logical validity of these claims we are not here concerned. That the requirement is a just one within certain limits is evident, and follows, indeed, from our conception of reality as that which is valid for all. A disregard of others' experience, which collectively reduces our own to very small proportions, and of the common forms of thought in which the experience of the race has formulated and conserved itself, whether in the truths of science, or in the wisdom of practical life, would be absurd presumption.

At the same time, these claims of authority are when unduly pressed opposed to what is known as individuality of conviction, the impulse to think out our knowledge for ourselves from the particular data of our own experience. The collision of the two impulses to assimilate our convictions to the common pattern, and at the same time to realise them by a clear process of individual experience and reflexion, gives rise to a new psychological type of belief, *viz., belief which we realise as ours through a process of self-conscious reflexion.* Our cognitions first form themselves as common cognitions, and the child says (or thinks) " *We* know " before it says " *I* know ". It is only as the discrepancies of experience and of conviction emerge, and the collision of the individual with the common thought is felt, that our belief becomes in this sense fully self-conscious.

Belief and Knowledge: Philosophy of Cognition. The psychological relation between individual and common belief here set forth is indicated to some extent in the current forms of language. In the popular use of the term, belief is not co-extensive with knowledge. The word rather marks off a particular sphere of conviction. To begin with, belief is com-

monly regarded as below knowledge in point of surety or certainty. We are wont to say "I know" when we are in the highest region of the scale of certainty, whereas we fall back on the form "I believe" when we are not quite positive. Again, since agreement of belief with that of others is in general taken as the criterion of certainty, it follows that when we find ourselves differing from others we are apt, through modesty at least, to speak of belief rather than of knowledge. To say "I know" in the face of another's explicit disagreement savours of presumption and conceit. Lastly, knowledge in its popular contra-distinction to belief means that which has been carefully reflected on and *thought out into a clear rational form.* Belief is blind; knowledge is clear-sighted; belief is instinctive, a matter of feeling; knowledge is carefully reasoned out and seen to be inevitable or necessary. This is clearly brought out in the common opposition of religious faith and science.

The psychological discussion of the distinction between belief and knowledge naturally leads on to the philosophical problem of the nature and validity of knowledge. The relation between the two, already touched on in connexion with perception and the nature of the concept, may be illustrated by a few additional remarks.

As already indicated (*cf.* p. 12), the philosophical or "epistemological" problem considers knowledge objectively in respect of its reality, while psychology considers it subjectively as a mental process. The truth or falsity of the intellectual phenomenon which we call a cognition is a matter of indifference to the psychologist: illusory perceptions are as much perceptions, *i.e.*, particular psychical phenomena, as true ones: the most absurd delusion of a maniac is of equal value with a perfectly rational belief for the psychologist's purpose

The properly philosophical inquiry into the ultimate nature and conditions of knowledge set out, not unnaturally, with a consideration of its mental source or origin. A mere glance at our ordinary processes of cognition suggests that there are apparently two such sources, *viz.*, the senses and thought or reason. The knowledge drawn from these seems to be different, the former telling us only of the particular which comes and goes, the latter of the universal and the immutable and necessary, *e.g.*, the law of causation. The first impulse of philosophy, following this common-sense distinction, was to erect reason into a special and superior source of knowledge, and to regard it as an essential factor in all true or valid cognition. This tendency is known as Rationalism or Intuitionalism, the word 'intuition' being used to mark off the alleged immediacy and certainty of this rational cognition. Opposed to this is the tendency to refer all cognition back to sensation, to regard it as essentially particular or 'contingent' (*i.e.*, not-necessary), and as assuring us only of the facts of our common sense-experience, *viz.*, sensations, and, as seems to be allowed also, the

observable temporal juxtapositions of these. This tendency is known as Sensationalism, Experientialism (or empiricism), and more recently (owing to the part assigned to the laws of association) Associationalism.

The dispute first directed itself to the question of the existence of certain 'innate ideas'. The significance of this dispute turns on the supposition of the intuitionists that an original idea, not traceable to experience, is implanted in the mind by the Creator and so carries its own validity on its very face. In its earlier form the controversy appeared to concern itself with the date of the appearance of these ideas. Here, it is evident, the philosophical discussion encroached on the psychological domain. In its later or more guarded form, however (particularly as shaped by Kant), the intuitionalist has differentiated his problem much more clearly from those of psychology. It is now made plain that, according to intuitionalism, the mind does not at birth possess ready-made intuitions; that, on the contrary, the materials of experience as supplied by the senses are necessary to the proper development of these intuitions. What the modern intuitionalist does assert is that these materials, even when supplemented by the processes of association, do not constitute what we mean by *cognition*, that in order to its constitution the mind must contribute its own proper *a priori* forms, and its own synthetic activity.

In approaching this question it seems certain that a psychological account of cognition, though distinct from the philosophical solution of knowledge, prepares the way for this. Thus the psychological theory of sense-perception, and of general ideas, by deriving the intellectual products from sensations as their psychical elements, *suggests* that the knowledge reached may represent and refer to these sensations: and indeed we find that the philosophical question has in this country more particularly assumed the form: Is cognition more than our assurance of particular sequences of sensation? The same thing is true of that modification of experimentalism introduced by the modern doctrine of evolution. In the transmitted products of ancestral experience with which certain evolutionists (*e.g.*, Herbert Spencer) endow the child, we have, it is evident, a psychological counterpart of the subjective factor of the intuitionalist. So far the doctrine appears to supply a reconciliation of the two opposed philosophical views. Yet in truth the philosophic problem remains, assuming now the form of the question: Is the mere play of sense and association, *however far extended through generations of men or species*, competent to the production and maintenance of *knowledge*, *i.e.*, the cognition of things as real, and as bound together by universal relations? [1]

[1] On the nature of the philosophical problem of knowledge the reader may consult Prof. Seth's article "Philosophy" in the *Encyclop. Britann.*; also Prof. Fraser's Introduction to the *Selections from Berkeley*.

REFERENCES FOR READING.

On the processes of thought and the psychological treatment of knowledge, see Spencer's analysis of reasoning, *Principles of Psychology*, vol. ii. esp. ch. viii.; also Ward, article "Psychology," *Encyclop. Britann.*, p 75 ff.; Lotze, *Microcosmus*, bk. ii. chap. iv.; and Hoffding, *Outlines of Psychology*, v. D.

PART IV.

THE FEELINGS.

CHAPTER XII.

FEELINGS: SIMPLE FEELINGS.

Having now reviewed the successive stages of the development of intellection or cognition, we may pass on to consider the development of the second of the three phases of mind, namely, the affective phase or feeling.

The Feelings and their Importance. As already pointed out, we include under the head of feeling all psychical phenomena so far as they have the element or aspect of the agreeable or the disagreeable. This preliminary rough demarcation of the region of feeling may help us to see its peculiar significance as a main constituent of our mental life.

To begin with, feeling marks off the *interesting* side of our experience. External objects only have a value for us when they touch our feelings. Mere cognition of an object may leave us cold, but the appreciation of its beauty, involving a wave of pleasure, warms and thrills us. It is evident that what we mean by happiness, and its opposite, unhappiness or misery, is made up of elements of feeling. We are happy so far as we are the subject of pleasure, unhappy so far as the subject of pain. Our estimate of things and of human life as a whole will thus depend

on those ingredients of our experience which come under the head of feeling.

Again, feeling is subjective experience *par excellence*. In all perception of, and all thought about, objects we are in the "objective attitude," that is, representing a world of common cognition. Our actions, too, involve changes carried out in the external world, and so have an objective aspect. But our feelings, save in their external manifestation, are all our own. To be affected by joy or by sorrow, to fear or to hope, is to have an experience which we detach from the object-world and refer to the subject-world or self. Feeling in all its higher and developed forms stands in close connexion with self-consciousness.

While feeling has thus a special intrinsic interest as a subject of study it has a further extrinsic interest because of its bearing on the other aspects of our mental life. The interactions of feeling on the one side with intellection and conation on the other will be more fully considered by-and-by. Here it will be enough to say that the cultivation of the feelings stands in close organic connexion with that of intelligence. To develop the powers of observation and of thought is to awaken interests, that is to say, to excite and raise to the position of strong incentives certain varieties of feeling. The cultivation of feeling connects itself on another side in the closest way with the development of volition As we shall see by-and-by, the prompting forces in our voluntary action are feelings when elaborated into motives. We exert ourselves under the stimulus of a feeling of hunger, of love, and so forth. Hence the consideration of the feelings connects itself closely with that of conation, and has, indeed, by some been altogether comprehended under this head.

Definition of Feeling. We may now seek to mark off the element of feeling more precisely by examining into its essential characteristics.

All psychical states that are distinctly pleasurable, or the opposite, plainly come under the head of feelings. Thus, to take the lower region of "bodily" feeling, it is generally agreed that the pain of a burn, or the pleasure of quenching thirst, is

properly described as a feeling. So in the higher region of so-called "mental" feeling or emotion it is recognised that the joy of success, the pain of bereavement, are examples of feeling.

In addition to such well-marked cases of pleasurable and painful consciousness we have to include under the head of feeling every psychical state so far as it has any agreeable or disagreeable aspect, however slight. Thus every consciousness of a difficulty or hitch in an operation, whether bodily or mental, is as such disagreeable, and so finds a place in the category of feeling.

It is evident that this comprehensive use of the terms pleasurable and painful enables us to say that most of our common experiences are coloured by some degree of feeling or affective 'tone'. Thus a close introspective observation tells us that sensations are in the large majority of cases, if not universally, accompanied by some amount of feeling. The same is true of the processes of ideation.

How far pleasurable and painful consciousness exhausts all that is properly included under the head of feeling is a point of dispute. According to some psychologists there is over and above these opposed modes a third mode, *viz.*, neutral feeling or bare, colourless excitement. Thus it is said that the primitive experience of shock, which later develops into the feeling of surprise or wonder, is an example of such a neutral or indifferent feeling. It is probable, however, that all that is properly affective in these and similar psychical states is characterised by a pleasurable or a painful tone.

Feeling and Presentation. As has been already implied, pleasure and pain do not occur as isolated experiences, but in close connexion with presentative elements, that is to say, sensations, and their derivatives, percepts, and ideas. Thus we commonly speak of a pleasure as one "of taste," "of colour," "of imagination," and so forth. We must now try to indicate this relation more clearly.

The first thing to do here is to mark off as sharply as possible the

presentative and the affective element. The presentative element is distinguishable from its concomitant of feeling by a certain determinate quality and local complexion. Thus a touch as soft, as experienced at a particular region, or over a particular surface of the skin, is pure presentation. On the other hand, the feeling-tone as such has no quality (apart from the radical difference of the pleasant and the unpleasant) and no local attribute, though it certainly has intensity and duration.

While thus capable of being distinguished by careful analysis, the presentative and the affective element are closely bound up one with another, especially in the region of sense-experience. This is clearly shown in the common way of describing feeling by epithets borrowed from sensation, *e.g.*, a "burning," a "pricking" pain. We have now to look into this connexion somewhat more closely. At first it might appear as if the presentative element and feeling are given together in strict simultaneity as different "elements in," or "aspects of," one experience. A closer examination shows, however, that the relation of the two elements is far less simple or uniform than at first appears. Thus common experience tells us we may have the sensation of a blow before we feel its painfulness, and experiment has confirmed the observation. Thus it has been found that from one to two seconds may elapse between the sensation and the feeling of pain when a corn is struck. It has been ascertained further that in certain diseases, and by help of certain drugs, the affective element may be extinguished and the presentative element remain. A certain mutual independence is further suggested by a comparison of the experience of different senses. In certain classes of sensation, *e.g.*, ordinary touches, the feeling element is quite subordinate if present at all, whereas we see in the region of organic sensation a marked preponderance of the affective over the presentative side. The sensation of a laceration or of indigestion has, as we saw above, no well-defined specific quality like that of colour, and is, indeed, by some regarded as a case of pure feeling.

We may summarise the results as follows :—

(1) There is a general concomitance between the presentative

element. that is, sensation or its ideal representative, and feeling--to the extent, at least, that there is no feeling which does not imply a minimum of presentative consciousness.

(2) The affective and the cognitive element do not appear with equal prominence in our sensational and ideational experience; the higher degrees of definiteness of presentation tend to keep down feeling, and conversely the higher degrees of intensity of feeling tend to hinder the full development of the presentative element as a sharply discriminated quality.

These results suggest that the physiological conditions of feeling, though including those of sensation, are in part different. But of the exact nature of these distinctive nervous concomitants little is known. It has been held by some that there are special nerves of pain, yet this is exceedingly doubtful. On the other hand, it is highly probable that all feeling involves a more extended central nerve-process than sensation.

Conditions of Pleasure and Pain.

We have now to consider the conditions or mode of production of feeling. Here, again, we shall confine ourselves in the main to the simpler feelings, those of sense, inquiring into their nervous conditions.

Law of Stimulation. The first and most obvious mode of variation of the process of sensory stimulation is quantity, and more particularly intensity; and a very little consideration will show that this exerts an influence on the resulting feeling. In the case of the higher senses, for example, while a moderate strength of stimulus. light, or sound, is agreeable, a greater strength becomes disagreeable. The same relation holds in the case of the reflex reactions called forth by sensory stimuli. A moderate exertion of attention to sights or sounds is agreeable, a severe strain becomes fatiguing, and so disagreeable. Similarly with respect to all muscular activity. Moderate exercise of a group of muscles is enjoyable, unduly violent exercise is fatiguing, that is, disagreeable.

Passing to ideational activity, a like relation appears to obtain. Apart from all differences among our representations, it may be laid down as a general proposition that the cerebral activity involved in imagination and thought is attended by some degree of pleasure, provided the effect of over-stimulation and of fatigue is excluded. Thus a rapid sequence of ideas to which attention is able to accommodate itself is exhilarating. On the other hand, a too sudden and overpowering intrusion of ideas, as also unduly prolonged and fatiguing intellectual activity, are disagreeable.

These facts have long since led to the formulation of a law of pleasure and pain, which may be called the law connecting pleasure and pain with quantity of functional activity, or more briefly the law of pleasurable and painful stimulation. It may be expressed as follows:—

The moderate stimulation of the central nervous organs is attended with pleasure, and the pleasure continues to increase with the increase of the stimulation up to the limit of excessive or fatiguing activity, at which point it gives way to a feeling of pain.

The expression 'moderate' stimulation is here used in a relative, and not in an absolute, sense. It has reference to the peculiar structure and to the temporary condition of the organ stimulated. It is probable that some nerve-structures which are called on for more frequent and prolonged activity, *e.g.*, those involved in vision, in the movements of the hands, recover more rapidly than others, and so allow of a longer pleasurable activity. Not only so, a vigorous condition of the organ, say, a group of muscles, or the muscular system as a whole, renders possible a greater intensity and a longer duration of pleasurable activity than a feeble condition.

Impulse and its Gratification: Pains of Want. In the above statement of the principle of stimulation no reference has been made to any impulse or disposition to activity. A correct view of our psycho-physical organisation requires us to bring in this element. Our organs may be more or less disposed to activity. This is specially true of the motor organs. These

may be in a state of special readiness or tension, so that the slightest amount of sensory stimulation suffices for exciting the activity. Such an organic disposition becomes an impulse where there is a conscious concomitant, *viz.*, a desiring or striving to act.[1]

These organic dispositions show themselves to some extent as original. This is illustrated in the instinctive impulse to walk, to examine things, to play, and so forth. They are, moreover, furthered by the habitual direction of our activity. We tend and feel impelled to do what we have been accustomed to do.

The effect of such organic dispositions on feeling is a double one. In the first place, the co-operation of the disposition or impulse is an important reinforcing factor in the pleasurable stimulation. When strongly impelled by hunger, by the impulse to muscular activity, to reading, and so forth, the pleasure accompanying the corresponding activity is proportionately increased. Hence the common way of looking at all enjoyment as the gratification of impulse.

In the second place, the delay of such gratification gives rise to a new variety of painful feeling, *viz.*, that of Want or Craving. To be hungry and not be satisfied, to want to read and have no book at hand, is in itself a misery.

Such painful cravings are, to some extent, periodically recurrent, and connected with rhythmical changes of organic conditions. These periodic organically-conditioned cravings are known as Appetites. They consist of the well-known bodily appetites, as hunger, thirst, sexual craving, together with other regularly recurring wants not commonly spoken of as appetites, such as the craving for sleep, for muscular activity, for amusement. This regular recurrence of craving becomes further fixed by habits of life.

By combining the principle of impulse and want with that of stimulation, we may say: *Pleasure, so far as it is connected with quantity of stimulation, lies between two extremes, excess and deficiency, each of which is painful.*

[1] The nature of impulse will be more fully considered by-and-by under the head of Conation.

Since our organs are useful structures needed for the carrying out of certain life functions, anything which serves to promote their efficiency is beneficial, anything which tends to destroy this efficiency, injurious. Moderate exercise conduces to efficiency. Hence the pleasures of exercise, including the gratifications of impulse which *draw* us to such beneficial action, together with the pains of craving which *drive* us thither, work to our advantage.

Quiet Pleasures: Repose. In the above account of the relation of feeling to quantity of stimulation we have left out of consideration an important modifying circumstance. Low degrees of stimulation seem to produce an effect of agreeable feeling disproportionate to their intensity. This is accounted for partly by the voluminousness and capability of prolongation of these pleasures, partly, too, by the fact that in the case of very weak stimuli, as *pianissimo* tones, and quiet shades of colour, there is a special activity of *attention* involved.

Pleasures which we call by the names idleness, repose, *dolce far niente*, appear at first to contradict the principle that pleasure is a concomitant of a positive activity. It must be remembered, however, that the delights of repose are relative, presupposing, in their higher intensities, at least, a contrast to a remembered exertion. Hours of inactivity, or idleness, fill a considerable place in those rhythmic alternations of work and rest which are required for healthy life. What we call doing nothing is, moreover, never really a state of complete inactivity. Thus the relaxation of the severer kinds of bodily and mental work makes room for a more vigorous discharge of the vital functions. In addition to this, idleness when pleasurable always involves something of play, that is, of gentle activity indulged in for its own sake.

Pleasure and Pain and Form of Stimulus. While intensity or strength of stimulus is thus one main factor in the determination of pleasure and pain, it is not the only condition. A difference in the form of the stimulus, answering to a difference of quality in the sensation, affects the tone of feeling also. Thus, in the region of taste, as we saw, a bitter taste is as such disagreeable in all degrees. Similarly all degrees of roughness in sound,

and all degrees of that alternate increase and decrease of stimulus constituting a beat, and supposed to form the essential ingredient in musical dissonance, are as such disagreeable. A like rule holds good in the case of a series of stimulations. In order that they be agreeable they must be arranged in a certain form. Thus a rapidly flickering light, even when not strong, may be very disagreeable. All jerky, irregular successions of stimuli as luminous and sonorous are as such disagreeable.

These and other facts suggest that all modes of stimulation are not equally suited to the efficiency or welfare of our organs. There seems to be a normal mode of functional activity, and on the other side an abnormal or injurious mode. In what precisely the injury consists, physiological science does not as yet enable us to say. It is possible that it consists in a measure of that destructive agency which we see in the case of severer pains of laceration.

Change as Condition of Feeling: Prolonged Stimulation. We now come to another important condition of pleasure and pain. As already suggested, a feeling is affected not only by the nature of the stimulus at work at the time, but by the preceding psycho-physical activity. Our consciousness is not a series of detached, disconnected "states," but a continuous movement, every stage of which is modified by previous stages. One of the most striking manifestations of this is the fundamental importance of change or contrast as a condition of vividness or full intensity of consciousness (see p. 98). And the influence of this condition is seen yet more clearly in the region of feeling than in that of cognition. In order to understand the effects of change on our affective states we must first consider the results of prolonged *unchanging* stimulation. The value of change as a condition of sustained pleasurable feeling depends on this circumstance.

The most general effect of prolonged stimulation is what we may call a weakening or *dulling* of the feeling. Thus, a prolonged pleasurable stimulation, as that of the eye by a sunny landscape or stage-spectacle, of the ear by music, and so forth,

results in a gradual falling off in the intensity of the pleasure. The exact course of such falling off is not as yet ascertained, but it may be said that there is a rapid and considerable decline at the outset through the loss of the initial freshness of impression, and then a slower and less considerable decline till an approximation to a dull uniform effect is reached. A similar result shows itself in general in the case of painful stimulation. A large part of our physical discomforts and mental troubles lose in intensity when prolonged. That is to say, they sink to the level of dull and obscure psychical phenomena.

The reasons of this general subsidence of feeling when excitation is prolonged are to be found partly in the lowered functional activity of the nerve-structures engaged, partly in a falling off in the attention through a decline of the stimulus of interest. In addition to this general effect there are more special effects. Thus in the case of prolonged painful stimulation the dulling effect is apt to be counteracted by secondary results, *e.g.*, extension of the range of suffering, as in toothache and other bodily pains. In the case of prolonged pleasurable stimulation, when this is powerful, we have the special effect of transformation. Owing to the oncoming of fatigue a stimulation which was pleasurable in the earlier stages may grow distinctly painful in the later.

Even when the prolongation falls short of this extreme effect, it may result in a mental weariness which arises from a *consciousness of the decline*. This effect is seen in all states of monotony, tedium or ennui. Here the sense of freshness departed and of dull, uninspiring sameness fills the mind. We grow weary of the drab complexion of things, and long for a more vivid colouring. The very fact that ennui includes a disagreeable consciousness of time (*i.e.*, relatively vacant time) shows that our surroundings, our doings, have ceased to engage our minds pleasurably. Thus ennui is a complex feeling, involving the imagination of other and livelier surroundings and pursuits and the *craving for change*. Hence it is in its more developed form a distinctively human feeling. A sporting dog may feel a germ of it, when he is shut indoors and impulse prompts to the more exciting pursuits of the

field. But it becomes fully developed only in the case of human beings pretty high up in the scale of civilisation.

Effects of Change. Having thus considered the result of prolonged unchanging stimulation, we may proceed to inquire into the effects of change.

The general effect of change is to sustain the full vividness of feeling. It prevents that falling off or dulling of feeling of which we have just given an account, and secures a measure of the initial freshness and strength. Not only so, since all change is attended with some *consciousness of change*, a transition as such is a cause of a new element of feeling which heightens the effect of the second stimulation. Thus in passing to a new pleasurable activity, as from brain-work to a game of lawn-tennis, we have in the consciousness of the transition a feeling of expansion, which as such is pleasurable. The quantity of the effect will vary, roughly at least, with the amount, as estimated by the greatness and suddenness of the change.

This action of change on feeling may be seen both in alterations of intensity or strength (the mode of excitation remaining unaltered), and in variations of the mode or form of activity.

The effect of change in the quantity of psycho-physical excitation is seen in the growing elation of rising activity. Many of our common pleasures, sensuous and intellectual, are illustrations of this effect. Thus the pleasure of passing from a dull into a bright light, of a *crescendo* passage in music, of conscious growth and advance in power, bodily or mental, illustrates the effect of heightened activity in giving us a full intense enjoyment. This effect, it is to be observed, involves a *consciousness* of heightened activity.

What holds of the rise holds also, *mutatis mutandis*, of the fall of activity. A descent from the full delight of sunshine to a comparatively dull illumination gives us, through the consciousness of contrast, a sense of loss. The smaller pleasure looks poor and contemptible after the larger. It is this circumstance which gives to exalted rank its special precariousness:—

The lamentable change is from the best.

The effects of change in amount of stimulation here briefly illustrated may be subsumed under the following principle :—

Change in the amount of stimulation increases or diminishes the accompanying feeling (beyond the point due to the bare difference between the stimuli) through the consciousness of contrast attending the transition; this added effect varying in intensity with the *ratio* of the two stimulations.

Coming now to changes in the form or mode of activity, we are prepared from what has gone before to see that variation of activity is one great condition of prolonged pleasure. The complexity of our organism and of the correlated activities, by producing a large number of recurrent readinesses for and dispositions to specific modes of activity, renders change of occupation a main condition of a healthy and enjoyable life. The need of such variation is further laid down in the laws of attention, the psychophysical activity of which can only be maintained when its direction changes from time to time.

What are known as the pleasures of variety involve, in addition to these conditions, a further psychical factor, *viz.*, the exhilarating sense of change and of freshness that attends the experience of varied activity. Hence the ancients were right in saying that it is the variation itself which delights (*variatio delectat*).

The charm of Novelty, about which so much has been written, illustrates the same principle. It is possible that certain first experiences owe something of their delightful character to special organic conditions which never recur later on. The first greeting of bright colour by the baby-eye may bring a wave of glad feeling which is never repeated. At the same time, what is customarily called novelty, as of a first ball, a first tour abroad, a new house, and so forth, owes its charm to the transition from the accustomed to the unaccustomed. That is to say, a 'novel' experience gives us in an exceptionally full and impressive form that transition from the stale to the fresh which enters into all variation.

As in the case of quantity, so here we may summarise the facts under the head of a principle :—

All change in the mode of our functional activity serves to

emphasise or intensify the feeling-concomitant of the new activity through a consciousness of such variation; and the amount of this added effect will vary in general with that of the (qualitative) unlikeness in the two activities, and with the degree of freshness of the nerve-structures subsequently engaged.

Negative Pleasures and Pains. One other consequence of the principle of change has to be illustrated, *viz.*, the effect of contrast in passing from a state of pleasure to its opposite, or *vice versâ*. Pleasure and pain are the most impressive contrast in our experience. Hence a transition from the one state to the other is always attended with a special intensification of feeling. Thus the passage from the pain of craving, as that of thirst, to the pleasure of satisfaction, from sickness and pain to health and enjoyment, from the misery of poverty to the delights of wealth, from the depression of a doubting to the elation of a confident love, and so forth, is a theme of remark in every-day life and in fiction. Conversely, the transition from health to sickness, dignity to shame, and the like, constitutes a well-worn subject of pathetic emphasis.

The facts here referred to may be formulated in the simple principle: Pain and pleasure alike are heightened or intensified, and have their disagreeable and agreeable side emphasised, by a transition from and contrast to the opposite phase of feeling.

According to Plato and others, all pleasure is something negative, *i.e.*, no really existent state, but the mere absence or non-existence of its opposite, pain, which is the positive and real state. This view makes it desirable to consider how far a mere change or contrast of state can determine the quality of a feeling as pleasurable or painful.

That there are pleasures and pains that seem to have their generating condition in such a negative circumstance is certain. We may instance the pleasure which comes from the cessation of physical pain. The termination of acute suffering is in itself the occasion of an outburst of joyous feeling. Similarly the solution of an intellectual puzzle which has been worrying us is a cause of a very considerable pleasure. On the other side, the loss of a

pleasure produces an appreciable pain through *a sense of loss* and the craving which attends this.

In other cases, too, we can see that the effect is mainly due to the transition from an opposite affective state. Thus the pleasures of health, of liberty, and so forth, are largely due to contrast, and are, therefore, rarely realised in any considerable measure, save as a transition from an actual or at least an imagined experience of the opposite condition, sickness, restraint, etc.

While, however, one may thus allow that the removal of a cause of pleasure or of pain may be a sufficient occasion for the on-coming of the opposed phase, it is important to add that such so-called negative feelings have in every case *one* positive condition at least, *viz.*, *the consciousness of the change*. An animal that forgot its pain the very moment the cause of it ceased to act could not enjoy the relief as we enjoy it.

We have then, in the circumstance of transition, *escape from* pain, *loss of* pleasure, an intelligible cause of that secondary mode of feeling which we call negative. This effect of relief is, however, limited. Many of the so-called negative feelings have positive neuro-psychical conditions as well. Thus the pleasure of health and liberty includes a positive stimulus in the shape of a new energetic outburst of long-repressed activity. And a large group of pleasures, as those of art, cannot without forcing be brought under the head of negative feelings at all. The large voluminous delight of a new book, of a picture-gallery, of a concert, cannot be described as an escape from a preceding state of painful craving.

Decay of Feeling: Habit or Accommodation. We have now to consider the modifications of feeling which are introduced by continuous or frequent renewal of stimulation *over longer periods of time*. Here new influences come into view which we may describe generally as the effect of Custom, Habit, or to employ a more technical expression, Accommodation.

In certain respects the effect of custom on feeling is similar to that of prolonged stimulation at a particular time: it tends to

blunt its first keen edge. "Ab assuetis non fit passio." Our permanent surroundings and manner of life tend to grow indifferent, that is, to lose all or most of their affective concomitants. This applies at once to our pleasures and to our pains. Thus we get used, that is, comparatively indifferent, to surroundings, companions, lines of activity, which, when they were new, were highly enjoyable, or, on the other hand, particularly disagreeable.

Where we have to do, not with unbroken continuance, but with periodic recurrence, the counteracting influence of freshness or variety comes in. All forms of pleasurable activity, *if sufficiently intermitted*, retain much of their pristine freshness. The pleasures of travel, of art, and so on, when indulged in rarely, illustrate this truth. The hedonic art of living includes among its foremost problems the determination of the degree of frequency at which the renewal of a pleasure more than compensates for the loss of its intensity through familiarity.

This decay or gradual abatement of feeling with permanence and custom may be supposed to involve some process of adjustment or accommodation in the nerve structures concerned, closely related to that perfecting of mechanical arrangements which, as we saw above, leads to the lowering of the psychical concomitant. What these changes precisely are, however, our physiological knowledge does not as yet enable us to say.

Counteractives of Decay: Habit and Feeling. This general tendency of continuance, frequent repetition, or custom, to produce a decay of feeling is, however, counteracted and in a manner disguised by other and more special tendencies. To begin with, the process of organic adjustment or accommodation just referred to is less simple than we have supposed. Exercise tends to strengthen an organ, and is one main condition of organic growth. One important result of this is that stimuli which were at first fatiguing and so painful may with repeated application become pleasurable. Thus an amount of muscle-work or brain work, which is at first unpleasant, may with increase of functional power become enjoyable. Another effect tending to disguise the general decay of feeling is due to its increasing com-

plication as experience advances and associations form themselves. In this way our friends, our books, and so forth, though losing some of their pristine charm, become endeared by associations.

The action of association leads on to the influence of Habit in the domain of feeling. What remains with us, what we habitually see, and habitually do, while it loses its keen pleasurableness, generates through habit an attachment or clinging of mind which betrays itself whenever it is removed. Jeannie Deans, feeling strange and lost in her London surroundings, and longing to get back to her familiar scenes, is an example of this effect. Every sudden rupture in our experience, as the loss of a familiar friend, shows the same force of custom in producing an attachment of mind. Here, then, we have an effect precisely the reverse of blunting. The older and more fixed the habit, the harder is it to bear the sundering of the bond. Habit is thus a fertile source of *negative pains*, or the pains of craving, a source which grows more prolific as life advances.

It is evident that we have in the special influences just considered elements which serve to limit the value of change or variety as a condition of a happy life. If we were always to abandon action at the stage at which it is unpleasantly laborious, we should never grow to the capability of all the higher and more difficult exercises of body and mind. The growth of intellectual and æsthetic interests presupposes a certain persistence in intellectual activity *in spite of its temporary painfulness*. This is a truth fraught with important practical significance. The educator who fears to give a child anything to do that is not immediately pleasurable can never develop its higher powers.

In the principle of habit or habituation we have a still more powerful opponent to the attractions of novelty and variety. The new fails to delight when it involves a too great and sudden rupture of continuity in our experience. Even a child with all its craving for novelty is apt to break down in despair in the midst of a social treat at suddenly waking up to the fact that it is in a strange room and among strange faces. The susceptibility to the charm of novelty on the one side, and to the mastering force of

habit on the other, have a different ratio at different ages and among different individuals. The art of happy living includes a nice adjustment of these opposing tendencies, the securing of the maximum of the pleasure of variety without running the risk of suffering through a deprivation of what has grown customary and so necessary.

Juxtaposition of Excitations: Harmony and Conflict. Thus far we have adopted the abstract supposition that feeling presents itself as a perfectly simple phenomenon, that it is occasioned by the stimulation of one organ or set of neural structures only, as the organ of taste. This supposition is probably never realised in our actual experience.

To begin with, then, owing to the continuity of structure throughout the nervous system the stimulation of a particular cortical area tends to propagate or diffuse itself over other areas. This effect is particularly conspicuous in the case of all markedly pleasurable or painful stimulation. Familiar instances of this are the agreeable secondary effects of pleasant rhythmical movements of the limbs, of pleasurable muscular activity in promoting circulation, etc., of certain unpleasant smells, and other sensations in producing disagreeable organic sensations (nausea). The importance of this diffusion of pleasurable and painful stimulation will appear by-and-by, when we come to consider what is known as the physical embodiment and expression of feeling.

This truth clearly points to a certain organic *rapport*, a kind of unconscious sympathy or "consensus" among the several structures connected. A pleasurable, that is, a beneficial, stimulation of one organ tends to a furtherance of beneficial functional activity in other organs. Similarly in the case of painful or injurious stimulation. The structure and mode of working of the nervous system tend, then, to produce the result of a more or less complete participation of the whole in the varying conditions of each part. The law of our nervous organisation is that of an ideal family or state : *the weal or woe of the part tends to become the weal or woe of the whole.*

While it is thus generally true that a wholesome or hurtful activity of one organ tends to produce a *like* condition in other and connected organs, the law is subject to a number of apparent exceptions. Certain modes of stimulation, which in themselves and at the time yield pleasure, *e.g.*, narcotics, indigestible condiments, produce, indirectly and later on, injurious and painful results. On the other hand, many stimuli, which are in their immediate and momentary effects disagreeable, as the first shock of the shower-bath, produce, indirectly, salutary and agreeable effects.

Complication of the process of stimulation may arise not only through the production of such secondary nervous excitations, but through the simultaneous and independent production of different nervous excitations. Owing to the very structure of the nervous system with its innumerable peripheral points of attack, and owing further to the large range of ideational activity in the case of the developed brain, we are exposed at any time to a multitude of stimuli, both extra-organic and intra-organic.

Owing to this circumstance of multifarious disconnected stimulation we are exposed to the action of Conflict, that is to say, the disagreeable effect which attends the opposition of disparate and incompatible activities. On the other hand, when the concurrent excitations are compatible and tend to merge in one large peaceful current of activity, we have the intensifying effect of Harmony.

The pain of conflict may be illustrated by the state of distraction, as in the perplexity of a chairman at a public meeting when two aspiring orators rise at the same moment. Such disconnected multiplicity of stimuli baffles the effort of attention to single out, and concentrate itself upon, some one object, an effort which, as we have seen, is a condition of a connected mental life.

A more specialised and distinct form of conflict arises where a particular psychical element tends by the nature of its content to inhibit a second as contradictory. Here, through the nature of the contents, all attempt to reduce plurality to unity is futile, and the sense of antagonism and mutual arrest and destruction grows full and intense. All disappointment of expectation is an example of this. To have the psycho-physical mechanism pre-

adjusted for a certain impression, and then to fail to receive this, introduces a peculiar modification of the feeling of jar. A weakened form of such disappointment presents itself in the effect of all that is foreign, incongruous, and 'out of place,' as that which deviates from the conventional standard in manners, dress, and so forth.

Other varieties of conflict are that intellectual form which presents itself in the state of doubt already spoken of, and in all logical contradiction; the feeling of social contradiction which we experience when our sentiments do not accord with those of others; and the sense of volitional conflict which arises when we are acted upon by opposing impulses, a state to be considered hereafter.

When, on the other hand, there is no opposition, but agreement, when the reality accords with our expectation, statement harmonises with statement, impulses converge to a single line of action, and so forth, there seems to be an expansion instead of a restriction of our conscious life, and we have the pleasurable feeling of harmonious activity.

As a last example of conflict and harmony, we may take the opposition of pleasure and pain, and the reinforcement of one pleasure by another.

The pleasurable and the painful, though antagonistic one to another, may arise together without giving rise to a distinct consciousness of conflict. One of the feelings may be so much stronger than the other as to thrust it into the background of the sub-conscious. In certain cases, moreover, the subordinate element, though partially realised, produces rather an effect of contrast than one of conflict. This is illustrated in the pleasures of sad reverie or melancholy, of tragedy, and the like. Here there is an under-current of painful feeling which is not fully realised as such, but which rather serves to throw into relief and so to intensify the feeling of pleasure, which is the dominant factor in the mood.

A full sense of conflict between pleasure and pain arises when the two feelings are both present in sufficient intensity and stability

and are not so unequal in point of strength as to allow of one overpowering the other. Thus the co-existence of a loud strident voice with a lovely face affects us like a musical dissonance. The death of Gloucester, whose

> Flaw'd heart
> (Alack, too weak the conflict to support!)
> 'Twixt two extremes of passion, joy and grief,
> Burst smilingly,

illustrates the effect of such conflict in its more intense form.

It may be added that, since pleasure is what we desire and like to retain, any intrusion of the painful on a pleasurable state, as the jarring effect of a wrong note in an otherwise beautiful work of art, is specially resented as a dissonance. Here the opposition between pleasure and pain is reinforced by the conflict of desire with reality.

In addition to this general relation of opposition and agreement among affective elements there are more special and definite relations In many cases there is something in the whole psychophysical condition with which a feeling is bound up rendering it specially antagonistic to, and exclusive of, certain other conditions. Thus all quiet, soothing varieties of pleasurable stimulation, as soft touches, slow, gentle movements of limb or body, soft and slowly succeeding sounds, put us into a certain psycho-physical mood which renders us indisposed to respond to more exciting stimuli. The sombre, melancholy pleasures are in this way incompatible with the more gay and exciting ones. On the other hand, any new mode of stimulation of a similar kind, that is, producing a kindred affective tone, is welcomed. When gay we look out for exciting pleasures, when melancholy we welcome all that harmonises with this particular tone of feeling.

Closely connected with the action of conflict and harmony among simultaneous excitations is the effect of rhythmic and unrhythmical combination among successive stimulations. A regular periodic succession of bodily movements seems to be conditioned by the very structure of our neuro-muscular organs.

Rhythmic movement is easy in itself, and as such pleasurable, and whenever we move freely we tend to move rhythmically. Hence the liking for it in all visible movements, as in those of a graceful walk, of the theatrical ballet, and so forth. It is to be added that the laws of attention require, as the condition of a pleasurable succession of sense-impressions, a certain degree of time-regularity or periodicity. This effect of eased attention is very conspicuous in the pleasure of rhythmic successions of sound.

It is probable that all such rhythmic successions involve rapid alternating preadjustments and satisfactions of expectant attention or expectation. In this way, then, it seems possible to connect the agreeableness of rhythmic and the disagreeableness of arhythmic series with the pleasure of harmony and its opposite.

The laws of pleasure and pain have been much discussed in ancient and modern times. Plato put forward a negative theory of pleasure, regarding it as something unreal, merely a filling up of a want or desire. Aristotle attacked this view and conceived of pleasure as real and positive and as connected with a consciousness of perfect or unimpeded energy.

In modern times, more especially in the writings of Leibniz and his followers, there has been a disposition to regard pleasure and pain as dependent on cognition, and more particularly a 'perception' of furtherance or hindrance of our condition. On the other hand, we note in more recent psychological works a tendency to refer pleasure and pain to *nervous conditions*. This idea assumes, in the writings of H. Spencer, Bain and others, the form of a biological doctrine, *viz.*, that pleasure is a concomitant of the maintenance of the whole sum of organic functions or of the organic equilibrium, pain, a concomitant of the disturbance of the same. (See Spencer's *Principles of Psychology*, vol. i. pt. i. ch. ix., and Bain's *Mental and Moral Science*, book i. chap. iv. sect. 6.)

Having now discussed the general features and conditions of Feeling, we may proceed to a consideration of the more important of its varieties, and the special laws which govern the development of these.

VARIETIES OF FEELING. (*a*) SENSE-FEELINGS.

How Feelings are to be Distinguished. We have seen that all our feelings are constituted by elements of pleasure

and pain. Strictly speaking, therefore, there are only two varieties of feeling, *viz.*, the agreeable and the disagreeable. All the various concrete feelings making up our actual experience, as those of hunger, cold, and fear, are, according to the view here adopted, *quâ* feelings, merely particular modifications of agreeable and disagreeable consciousness. What makes us speak of them as different feelings is, to some extent, the dissimilarity in respect of feeling-characters themselves (intensity, course of change), and still more the difference in the sensational or other presentative materials with which the feeling-element is incorporated.

✓ That our classifications of the feelings do largely turn on the differences of presentative character with which they are bound up is seen in the case of the broad division adopted by common thought and psychology between physical or 'bodily' feelings, and 'mental' feelings or emotions. This distinction is obviously based on the mode of excitation of the feeling and on the nature of its presentative basis. A bodily feeling, as hunger, or tickling, is directly due to a process of peripheral nerve-stimulation, and is the concomitant of what we call a sensation. On the other hand, an emotion, such as fear, or anger, always involves some central (perceptional or ideational) activity, and may, in contradistinction to a bodily feeling, be marked off as *centrally* excited. This primary division is too firmly fixed in common thought to be set at nought. Hence we shall make this bipartite division our starting-point in the treatment of the subject. The first class will be spoken of as Sense-Feelings, the second as Emotions.

Characters of Sense-Feelings. By a sense-feeling is meant one that is determined by certain features in the process of peripheral sensory stimulation, such as the intensity of the stimulus, or its peculiar form (answering to quality of sensation). Examples of sense-feelings are those accompanying sensations of heat and cold, taste, smell, muscular activity, in their several degrees of intensity. After our numerous references to these in illustrating the general properties of feeling, we may dismiss them with a few additional words.

As already pointed out, feeling is a prominent feature in our organic sensations, those which accompany the actions of the vital organs (nutritive functions), tending indeed to mask the presentative aspect altogether. Another feature to be noticed in the organic feelings is the greater conspicuousness of the disagreeable, as compared with the agreeable element. When we think of a feeling of digestion, we naturally represent an uncomfortable sensation. This is explained by a reference to the principles of change and accommodation dealt with above. The pleasures of organic life, being the concomitant of normal and so habitual activity, rarely grow into an appreciable quantity. We may be deriving a certain mild voluminous pleasure from breathing under favourable circumstances, but we only note the pleasure as an appreciable quantity in passing from a lower to a higher functional activity, as in stepping out from a close room into the fresh air outside. Pain, on the other hand, being the concomitant of disturbance, is comparatively exceptional, and as such impressive.

Since, as we have seen, the organic sensations tend to fuse or coalesce in an undiscriminated mass of sensation, the feelings which immediately accompany them usually blend also. The result of the coalescence of the numerous elements of agreeable and disagreeable feeling at any one time constitutes what is known as the general feeling of life (vital sense). This, when the resultant tone is preponderantly agreeable, is spoken of as a sense of physical well-being or health, when the resultant tone is markedly disagreeable, as a sense of physical depression, of ill-health, or *malaise*. This composite feeling forms the ground-tone of what we call the mental mood or temper of the time.

Coming now to the special senses, we find that in the case of Taste and Smell the affective element is pronounced. We frequently distinguish the sensations of these senses according to their affective aspect as agreeable or disagreeable, *e.g.*, 'sweet' perfume, 'nasty' taste. In Touch, we have both the presentative and the affective element well marked. The difference of the

agreeable and the disagreeable here coincides with certain qualitative differences, *e.g.*, smooth and rough, partly with differences of intensity and volume, as seen in the special enjoyment of gentle and extended pressures, an effect illustrated in the luxury of the yielding cushion, the delight of the caress of the hand, and of the embrace.

In the case of the two higher senses, Hearing and Sight, we find that the element of feeling falls back to some extent owing to the greater degree of definiteness (in respect of quality, etc.) of the presentative element. At the same time, these senses contribute a large range of fairly intense feeling. The relation of the pleasurable and painful to the quantity and the form of stimulation is best studied in connexion with these senses. The pleasures of the several colours, as also those of tone, timbre and harmony, show in the clearest way the connexion of feeling with quality of sensation or form of stimulus. It is to be noted that in the case of Sight and Hearing the agreeable is quite as pronounced as the disagreeable, and in the case of sight, at least, tends to preponderate over the disagreeable. In this respect these senses show the opposite relation to that seen in the organic feelings. Owing to the wide variety of stimuli available, and the varying modes in which the sensations may be agreeably combined, *viz.*, pleasing time forms in the case of the ear, space and time forms in the case of the eye, these senses allow of a much more prolonged enjoyment than is possible in the case of the lower senses. The fact that all the Fine Arts appeal either to the ear or to the eye sufficiently attests this truth.

As a last group of sense-feelings, reference may be made to the feelings which are the concomitants of Muscular Sensations. Here we have feelings connected with a palpable mode of conscious activity. As already implied, these feelings illustrate in a peculiarly clear manner the influence of amount of stimulation on the affective tone.

Complexity and Alteration of Sense-Feelings. It follows from what has been said respecting the uniform sequence

of a motor reaction on a sensory stimulation that our sense-feelings are from the first never perfectly simple phenomena. The pleasures of the palate, of the eye, and so forth, *are always complicated by the affective concomitant of the reaction called forth.* It must be remembered, too, that one important branch of this reaction is the adjustive process of attention, which itself, as moderately stimulated or overpowered, contributes an element of the agreeable or disagreeable to the whole psychical result.

Our sense-feelings undergo a double process of alteration as experience progresses. To begin with, there seems to be a considerable falling off in the pristine intensity of sensuous enjoyment. This is supported by the fact that many persons can recall a delicious intensity of feelings of touch, colour, etc., which appears, at least in retrospect, vastly superior to later experiences. These facts seem sufficiently explained by the agencies of accommodation already dealt with, and the growing preponderance of the intellectual or presentative consciousness. As was pointed out above, we attend to sensations, under ordinary circumstances, only so far as they are signs of things which are important to us. Experience tends, in the way already shown, to invest our sensations with objective significance, and this objective reference is that which has most practical interest for us. Hence we do not realise the full sensuous enjoyment of colours, of tones in a voice, because these objective suggestions instantly occur and monopolise the attention. Artistic training of the eye involves the stripping off of these after-growths so as to get something approaching to the pure sensuous effect which is the prerogative of childhood.

While, however, experience thus tends to dull the first keen delight in sensation, it effects another and compensatory kind of change in our sense-feelings. Thus if the blue loses its first sensuous charm it gradually accumulates new attractions through the grafting on of agreeable suggestions of sky and so forth. The effect of these associative processes will be considered in the next chapter.

REFERENCES FOR READING.

On the distinction of pleasure and pain and the conditions which determine them, see Hamilton, *Lectures on Metaphysics*, ii. xli. ff.; Bain, *Mental and Moral Science*, bk. i. chap. iv., and bk. iii. chap. i.; H. Spencer, *Principles of Psychology*, i. § 124 ff.; Ward, article "Psychology," *Encyclop. Britann.*, p. 66 and following.

The special features of the Sense-Feelings are dealt with by Bain, *op. cit.*, bk. i. chap. ii., and Grant Allen, *Physiological Æsthetics*, chaps. iv. and vii.

CHAPTER XIII.

(*b*) COMPLEX FEELINGS: EMOTIONS.

We have now to pass to the consideration of the second great class of feelings, those commonly known as Emotions or Passions, such as joy, grief, fear, anger, love.

Structure of Emotion. As pointed out above, an emotion differs from a sense-feeling in having a mental, or, to speak more precisely, a central psycho-physical, origin. The pain of a prick is supposed to be the result of the afferent process in the particular nerve stimulated. The child's fear of a dog obviously has its starting-point in a central psycho-physical process corresponding to what we call the percept or an idea of an object. Since, as we have seen, even a percept involves a representative element, we may say that *emotions are in general marked off from sense-feelings by the presence of a representative factor.*

In the second place, an emotion is characterised by a wide *diffusive* effect. Sense-feelings, though complicated in a measure, are relatively restricted in respect of the range of nervous excitation involved. On the other hand, an emotion of anger or terror is marked by a wide ranging excitation, involving the voluntary muscles and the viscera (heart, respiratory organs, etc.). These diffused effects in their turn contribute reflexly a number of secondary sense-feelings which constitute an important and characteristic part of the whole emotion.

We may say, then, that an emotion is a complex psychical phenomenon made up of two factors, or, as we may call them, stages: (*a*) the primary stage of central excitation; and (*b*) the secondary stage of somatic resonance. The first includes the

sensuous effect of the initial peripheral stimulation, together with the representative elements associatively conjoined with this: whereas the secondary stage includes all the ensuing modifications in tension of muscle, organic function, etc. Thus, an emotion of fear at a sudden noise is divisible into a primary phase, the disturbing sensation and the vague consciousness of danger, and a secondary phase, the organic concomitants, *viz.*, loss of muscular power, disturbance of heart's action, pallor, alteration of secretion, etc. These two factors, the central and the somatic, will be found to combine in very different proportions.

Rise and Fall of Emotion: Emotional Persistence. Our brief account of the composition of an emotion has led us to see that it is a process occupying an appreciable time. The pain resulting from a prick may be momentary, disappearing with the withdrawal of the stimulus. But a state of grief requires time for its full realisation. An emotion undergoes a certain rise or development from the stage of just appreciable excitement up to culmination. This course of development is determined, to some extent, by the range of resonant effect, the reflex results of which, while all occupy *some* duration, require unequal times for their realisation, and so constitute a gradual expansion of the whole emotive current. We do not become fully angry until our muscular apparatus has gone through the proper amount of characteristic action, as frowning and clenching of teeth. Similarly, fear is only fully realised when the cycle of organic effect is allowed to proceed unchecked. To this must be added that in the case of all but the primitive instinctive emotions there is the need of a certain mental occupation with the exciting cause. Thus an emotion of fear or anger grows through the gradual representation of the danger or the injury.

With this gradual rise or development, there goes a gradual fall or subsidence. A great joy, a fit of terror, only dies away and leaves us calm after an appreciable, and, in some cases, considerable time. This persistence of emotion seems most readily explained by the large range of bodily disturbance involved. These modifications of muscular tension, circulation,

secretion, etc., are apt to persist, and in this way the emotive excitement is prolonged. The influence of the bodily resonance in prolonging a state of emotion is seen in the fact that we often go on feeling afraid, angry, and so forth, after the exciting cause is known to be removed.

Influence of Emotion on the Thoughts. We are now in a position to understand more fully the effect of emotion on the intellectual processes. This may be viewed under two aspects: (*a*) the negative or inhibitory effect; (*b*) the positive or promotive effect.

The inhibitory effect of emotion springs out of the fundamental opposition of strong feeling to intellectual activity. This phenomenon is very strikingly illustrated in the immediate results of all violent emotional agitation or shock. The sudden arrival of a bit of exciting intelligence, whether of a joyful character, as the inheritance of an unexpected fortune, or of a miserable character, as the death of a beloved friend, is apt to paralyse thought for a while. Further, all intense and prolonged painful emotion tends to retard the processes of thought by depressing or exhausting the nervous system.

On the other hand, emotion as cerebral excitement is in its less agitating degrees distinctly promotive of ideation. We never have in our cooler moments such a swift rush of ideas as we have in moments of emotional excitement. This exhilarating effect is, of course, seen most plainly in the case of *pleasurable* emotion, agreeably to the principle already unfolded that pleasure furthers functional activity. But it is not wanting in the case of painful emotion, provided it is confined to the stimulatory pitch and is not allowed to become prostrating.

This furtherance of ideation by emotion, however, is rarely if ever impartial, and herein lies its chief drawback. It is a well-known fact that all emotion, when it is fully developed and grows persistent, tends to colour or give a particular direction to the ideas of the time. The terror-stricken man has his thoughts obstinately directed towards the terrible aspect of things. In extreme cases, his mind may become permanently occupied by a fixed idea (*idée fixe*) of a terrifying character.

The explanation of this selective action of the feelings on the ideational material supplied by the suggestive forces of the time is to be found in those tendencies already dealt with under the head of harmony, and bodily resonance. Every emotional state is characterised by its own affective tone; and this favours the rise of all presentations having a kindred effect, while it inhibits the rise of those which would conflict with it.

Having thus briefly considered the composition and the more important effects of emotion in general, we may proceed to study the chief phases of the development of our emotional life. And here we may best begin with a more detailed account of the primitive or instinctive features of our emotions, and then proceed to trace out the more important results of experience and association in developing or otherwise modifying the instinctive manifestations.

Development of Emotion.

The Instinctive Factor: Expression. The general character of the emotive outburst or discharge has already been sufficiently described. It may be defined as a wide-ranging reflex motor excitation involving some, at least, of the 'voluntary' muscles, as well as those by which the vital actions, *e.g.*, circulation, digestion, are carried out, and, finally, the nerve-structures which are known to influence the actions of the several secreting organs, as the salivary and lachrymal glands. This reflex diffusion of the nervous excitation in emotional stimulation is a primitive fact of our organisation. It shows itself distinctly in the first weeks of life. It has much in common with those reflex movements which are brought about by congenital arrangements, and which, as we shall see later on, form one of the main rudiments of voluntary action.

What we call the expression of an emotion is merely that part of this reaction which is observable to others, and which helps us to read one another's feelings. Thus it includes, first of all, the actions of muscles, as those of the limbs, face, and vocal organs,

which distinctly betray their effects. We read a happy emotion in the movements of the eye and mouth which constitute facial expression. Other reactions involving the organs of respiration, circulation, and even digestion may enter into the expression of an emotion. Thus the disturbance of the respiratory process in sobbing, the pallor in fear due to altered vaso-motor action, the excitation of the lachrymal gland in weeping, are among the best-recognised manifestations of emotion.

Differences of Emotive Reaction: Pleasurable and Painful Emotion. The bodily resonance varies conspicuously in the case of different emotions. To begin with, there are certain aspects of the reflex discharge which are determined solely by the quantity and the suddenness of on-coming of the emotive excitation. It may be said that all emotive excitement, irrespectively of its pleasurable or painful tone, produces a muscular reaction which varies, in respect both of the range of muscles involved and of the extent of their contraction, with the quantity of the feeling, and accordingly increases as the emotion rises.

While, however, there are certain features in the reflex discharge common to all kinds of emotion, it is well known that the resonance varies in character with the quality of the feeling. Thus the all-important difference between pleasurable and painful feeling effects a certain differentiation in the physical concomitants. According to the principle laid down above, we shall expect pleasurable feelings to produce in general (and within the limits of injurious shock) beneficial and pleasure-yielding concomitants. And this is certainly what we find. Thus, as there pointed out, enjoyment furthers the vital processes. The dyspeptic knows the beneficial influence of cheerful society and talk at table as an aid to digestion. Painful emotion, on the other hand, when sufficiently prolonged to show its characteristic effect, is in general attended by a lowering of vital action. This is best seen in the case of grief of all kinds, whether from the loss of a friend or of fortune, or from other cause.

Specialised Manifestations of Emotion. In addition

to the broad contrast between the manifestation of pleasurable and of painful emotion, there are the finer differences which mark off particular varieties of emotive state, as fear, anger, love, and the rest. Each of the well-marked species of emotion has its characteristic group of reactions. Thus fear is differentiated from other emotive states in general, as well as from other varieties of disagreeable feeling, by its peculiar organic resonance, including such familiar effects as that disturbance of the heart's action known as palpitation, tremor of muscles, pallor, certain alterations in the secretions (*e.g.*, saliva).

These different somatic resonances constitute, through the reflex sensations to which they give rise, so many distinctive emotive colourings; and there is little doubt that this resonance is an integral factor in, and an important characteristic of, the whole emotive state.

These characteristic resonances supply further a differentiated language of the emotions. It is because the visible and audible part of a psycho-physical state of fear is well defined and distinctive that we are able to read one another's feelings so rapidly and so easily.

In the case of all the more primitive emotions, those which the civilised man has in common with the savage and with many of the lower animals near him in the zoological scale, such as fear, anger, love (in certain of its forms), this characteristic signature is in its main features common to all members of the species. Thus the laugh of joy, and the trembling of fear, are common to all grades of civilisation and all ramifications of the human race. The characteristic manifestation, moreover, shows itself in early life as a strictly instinctive reaction which is referrible to certain congenital arrangements in the nervous centres.

Now it seems evident that the possession of a definite system of emotive signs is of real use to any species of social, *i.e.*, mutually helpful animals, and biological speculation enables us to conceive how such a system may have arisen. According to this there are two main influences which have served to originate the particular characteristic expressions we possess. These are: (*a*) the survival merely as expressional sign of what was once a

movement useful for some definite end, as self-preservation, and (*b*) the extension of such movement by similarity of affective tone, or what has been called "the analogy of feeling," to other and kindred emotive states.

As an illustration of the first, we may take the clenching of the fist in anger, which seems plainly a survival of fighting habits. Similarly the characteristic mean shrinking attitude of fear may be explained as the sub-excitation of the useful action of evading attack. The second principle is illustrated in such actions as scratching the head in mental perplexity, this action having been originally serviceable in allaying an analogous sense-feeling. Similarly the smacking of the lips by the savage to express pleasure generally may be supposed to be due to the transference of a movement originally useful in connexion with eating.

Inherited Emotive Associations. So far as we have yet considered it, an emotion is instinctive in the sense that the reflex discharge follows when the appropriate stimulus, *e.g.*, the experience-gotten suggestion of danger, is forthcoming. But modern research helps us to go further than this, and to say that, in certain cases, at least, the emotive condition is excited *independently of its customary presentative excitant*. Thus it is well established that children display fear before strangers, before dogs and other animals, and this at an age which precludes the idea of any individual experience of evil in this connexion. Here it is evident the whole emotive phenomenon is instinctive. We express the fact by saying that the child has an instinctive dread of certain animals, and so forth.

Such instinctive connexions between particular percepts and particular emotive discharges may be marked off by the description, Inherited Emotive Associations. A plausible explanation of such connexions is that they are the transmitted result of oft-repeated ancestral experiences. Thus the baby fears the unknown animal, because human experience through many ages has tended to connect ideas of danger with wild animals.[1]

[1] This involves the theory that acquired characters can be transmitted (*cf.* above, p. 75).

Effect of Experience: Modification of Instinctive Reactions. In considering the effect of experience and education on emotion, we have first to recognise their action upon the reflex somatic discharge. The full naive manifestations of the child and the savage become modified by the forces of education or culture.

In the first place, the early emotive discharge becomes toned down and restricted. The emotions take on a quieter form as life advances. This is more particularly true of certain unlovely or morally reprehensible feelings, as rage. This quieting effect is due to the development of conation. Passion no longer spends itself in aimless utterance, but, controlled by will, directs itself in the channels of useful action.

In the second place, what we call education tends to differentiate the forms of emotive expression still further, substituting for the common primitive language a number of dialects, answering to different nationalities and different social strata. Thus a great deal of the pantomimic gesture of the races of Southern Europe is obviously learnt by imitation.

One other influence of experience on the somatic reflex in emotional states must be alluded to, *viz.*, the effect of repeated indulgence in an emotional state in fixing and strengthening the *disposition* to that mode of discharge. This is an illustration of the principle of habit, which, though it tends, as we have seen, to dull feeling, tends also indirectly to fix and further it by strengthening the disposition to the appropriate motor reaction. A child who is allowed to fall again and again into the mental and bodily attitude of anger contracts a stronger organic disposition to react in this way, a fact clearly seen in the greater rapidity of the outburst, and in the diminished strength of the stimulus requisite for calling it forth.

√ **Growth of the Presentative Factor in Emotion: Ideal Feeling.** The development of our emotional life, while thus influenced in a measure by modifications of instinctive reaction, is chiefly dependent on the extension and accumulation of presentative material. We have already seen that an emotion contains a presentative factor. Thus fear, love, and so forth, are excited

by certain percepts, together with the ideas which these percepts suggest. Overlooking the possible action of special inherited associations, we see that emotion proper, as distinguished from mere sense-feeling, only displays itself when experience supplies the necessary presentative stimulus. The growth and expansion of emotion, its diffusion over a larger and larger range of object, its recoverability and extension in time, its differentiation into a larger and larger number of varieties or states, is due to this action of experience and association.

In considering the effect of representation on emotion we must set out with the fact that when a feeling is an accompaniment of a sensation (presentative state) it reappears in a weaker degree with the corresponding representative element. Thus the pleasure attending a sensation of light, of satisfying thirst, and so forth, is revived or re-excited in a weakened form with the representation of the sensation. This reappearance of a sense-feeling through the reinstatement of the representative copy of the original sensation may be described as revived or as "ideal" feeling. It appears to receive its explanation from the circumstance that the image has for its neural correlative a weakened excitation of the same central nervous elements that were engaged in the production of the sensation.

Since the revived feeling is thus organically connected with the representative image, it follows that its recoverability depends in general on the revivability of the presentative element. It is a familiar fact that the pleasures of the higher senses, tones and colours, are revived in greater proportionate intensity than those of the lower senses. As everybody knows, it is hard to recall the pleasures of the table, still harder to recall pleasurable or painful organic sensations.

How Feeling is Revived: Associated Feeling. In tracing out the consequences of such revived feeling, the first point to consider is whether the process of assimilative conservation of sensation traces tends to the preservation of the affective element as well. It has already been pointed out that repetition and custom exert a dulling effect on the sensuous feeling We

have now to inquire how far this dulling effect is counteracted by the results of assimilative cumulation.

In all cases of recognition of a pleasure-bringing object after an interval of separation, we can trace the effect of such a cumulation. Thus, in trying a favourite musical instrument after a period of disuse, we have the pleasure of tone appreciably increased by revivals of similar experiences. In certain cases, moreover, the very consciousness of recurrence contributes a new element of feeling. This applies to the deepening of horror through the repetition of a crime, as in the case of certain recent murders, the deepening of gratitude through the repetition of a like favour, and so forth. Here the effect of assimilative cumulation grows more distinct.

The revival of feeling is always, to some extent, the work of contiguous association. That is to say, a feeling occurs in the weakened 'ideal' form only when there arises the representative copy of a sensation of which the original feeling was the concomitant. Thus it is a revived feeling when the sight of a cool stream recalls the pleasure of the bath.

This revival of feeling through associative connexion with presentative elements is a fact of far-reaching consequence, for our intellectual and for our emotional life alike. The effect of this association on the former is seen in the fact that, feeling being the source of all that we call interest, the presence of a strongly-marked affective concomitant in a presentation or series of presentations tends greatly to a selective retention and reproduction of these. Not only does such an affective concomitant in the sense-experience serve to fix a vivid impression, but the weakened feeling which attends the uprising of the representative image serves in the reproductive stage to awaken interest, and so to secure the proper adjustive process of attention (*cf.* above, p. 212). It is, however, the effect on the growth of feeling itself that we are here specially concerned to trace out.

The mode of action of associative integration in developing new varieties of feeling may be illustrated in the gradual enrichment of our sense-feelings. Let us take a particular sound, as the

cawing of a rook, which, in itself, is certainly not agreeable. This sound, in the case of those who have lived in the country in early life and enjoyed its scenes and its adventures, is well known to become a particularly agreeable one. To some people, indeed, there is hardly any more delightful sonorous effect than that of this rough, unmusical call. The explanation is that this particular sound, having been heard again and again among surroundings, as park and woodland, which have a marked accompaniment of pleasure, has become contiguously interwoven with these presentations, and so produces a faint re-excitation of the many currents of enjoyment which accompanied these. Here, then, we see that particular presentations take on more and more of the feeling concomitant through successive processes of contiguous integration with other distinctly pleasurable (or painful) presentations.

It is to be noted that this associative integration of presentations with affective elements differs from that which connects presentations one with another. The feeling-mass, which has become conjoined with a given presentation through the medium of associated presentations, tends to appear *without the revival of the latter*. In other words, the feeling is said to be associatively *transferred* to a new presentation. Thus the cawing of the rook excites a pleasurable feeling *directly*, that is, without any distinct representative consciousness of country scenes, so that the feeling appears to belong to the sound just as much as if it were a sense-feeling proper. Similar effects are seen in the transference of horror and other feelings to places, of dignified and undignified associations to names, and so forth.

It follows from this that complex mental states may form themselves, in contiguous attachment to particular percepts, in which the feeling-element is predominant and the presentative remains in sub-conscious abeyance, that is to say, is only very vaguely differentiated and recognised in its constituent parts. Such a presentative-affective complex, appearing as a large undiscriminated feeling-mass, is precisely what we mean by an emotion on its presentative side. Thus the wave of feeling awakened, after an interval of separation, by the sight of a familiar object,

which is dear to us, *e.g.*, our home, our favourite book, our beloved friend, is, in its initial as distinguished from its resonant stage, the outcome of a number of confluent associated pleasures. It is this process of transferential enrichment, leading to a deepening or a *development* of our feelings, which is most effective in counteracting the decay of feeling through accommodation.

It may be well to point out that this principle of associative transference is one of the highest practical importance. It enables us to a large extent to create likes or dislikes for relatively indifferent objects by investing them with agreeable or disagreeable associations. Locke suggests that boys would take to books as eagerly as they take to play if study were only invested with the semblance of play: and More, in his *Utopia*, shows how in his ideal community gold and silver come to be contemned by reason of degrading associations.

The same complex integration which serves to develop pleasurable and painful emotions tends to bring about those mixed emotional effects which we so frequently experience. Our feeling for a locality, for a person whom we have known intimately, for a well-studied author, and so forth, is rarely an unmixed one. A tangle of agreeable and disagreeable associates results in a mixed emotion, in which now the pleasurable, now the painful factor is uppermost.

Differentiation of Emotion: Refinement. As the last result of this process of presentative-affective integration, we have that growing differentiation of emotive masses which is one of the characteristic features of mental development. As an example, we may take the emergence of a feeling of anger proper out of the primitive undifferentiated baby-misery (as seen, for example, when the child is being dressed); and the differentiation of this early anger itself into many varieties of shade, as the feeling we cherish for a successful rival, for one who has injured us when wearing the mask of friendship, and so forth. This fine ramification of emotion is due to the ever-increasing differentiation of the integrated masses just spoken of. In the case of the more intellectual emotions—particularly, the æsthetic and moral sentiments—

this differentiation reaches, in the case of cultivated persons, a specially high point. To be *differently* affected by two musical composers or two authors, to be differentially responsive to all the possible *nuances* of moral colouring in a lie, is the mark of a refined emotional nature.

VARIETIES OF EMOTION.

Classification of Emotive States: Order of Development. It is customary in psychological works to attempt a systematic arrangement of the emotions in which the similarities and differences of psychological (*i.e.*, presentative-affective) character would be indicated by the proximity and the remoteness of the several groups. Such classifications are familiar to us in the classificatory branches of natural science, *e.g.*, botany and zoology.

A ground for such a classification appears to present itself in the fixed distinctions of common thought, which not only marks off pleasurable from painful emotion, *e.g.*, joy from grief, but distinctively names particular modes of emotive excitation, *e.g.*, fear, anger, pride.

As soon, however, as we try to carry out any precise scientific division we find the difficulties insuperable. Material objects, as minerals or plants, are presented as *separate* things, and though the complexity of their affinities occasionally renders the placing of a particular form a matter of difficulty, a systematic arrangement of them in higher and lower classes is, in the main, practicable. Far otherwise is it with those psychical phenomena which we call emotions. What we call an emotion of fear is a changeful course of feeling which shows the greatest variations at different stages. Owing, too, to the complex structure of emotions, their affective tone may vary indefinitely through variations in the mode of composition. Thus the feelings which we commonly class together as emotions of joy and of grief will exhibit an infinite number of shades answering to the particular modes of presentative consciousness, and the particular currents of feeling

to which these give rise. No precise systematic arrangement can therefore be attempted.

The only thing that can be aimed at here is to mark off certain broad distinctions among emotive phenomena. As already hinted, the emotions distinctively named in common life, *e.g.*, pride, love, have a well-marked differentiating bodily manifestation. These characteristic differences of corporeal resonance must, it is evident, be the main basis of any natural history arrangement. This, however, will have to be supplemented to some extent by a reference to differences in the mode of excitation, or the presentative phase of the emotive state.

Having thus succeeded in marking off, roughly at least, the main varieties among our emotive states, we should proceed to deal with them in a progressive order. That is to say, we should seek to arrange them serially, so that simple forms might precede complex forms. This serial arrangement is possible up to a certain point. By analysis we can see that some emotions are constituted by the combination, in revived or ideal form, of other and simpler emotions. Thus the sentiment of justice embodies in a higher representative form, and takes up into itself something of the flavour of the earlier and simpler passion of anger or resentment.

Analysis does not, however, enable us to devise a perfect serial arrangement of the emotions. We have then to fall back on a natural history study of the *order of appearance*. Here we shall have to do immediately and mainly with the typical development of the human individual, confirming the results of our observation of this by what is known of the progressive manifestation of emotion in the development of the race and of the zoological series. This order will, it may be assumed, correspond in the main with the order of complexity or degree of representativeness.

Three Orders of Emotion. Without aiming at scientific precision and exhaustiveness where these seem to be excluded, we may group the more important varieties of emotive reaction under three stages of manifestation.

(1) Under the first fall certain common unspecialised mani-

festations of pleasurable and painful feeling, which are best described by the current terms, Joy and Grief. As examples we may take the delight of the child in his bath, his fits of misery when in pain, and for a time afterwards. These are the emotions which first appear in the life of the individual and of the animal series.

(2) Next to these common undifferentiated forms of emotive reaction come the specialised forms to which frequent reference has already been made. We may take anger, fear, and fondness or love as examples. These emotions appear in a clearly recognisable form later in the mental history of the individual than the first undifferentiated group. As based on special congenital arrangements and shared in by all the higher animals, these specialised emotions may be marked off as Instinctive or Animal emotions.

(3) As a third order of emotive states we have a group of feelings characterised by a high degree of prominence of the representative or ideational element. They may, roughly, at least, be marked off as Human feelings in contradistinction to the instinctive emotions common to man and animals just referred to.

These Representative emotions, as they may be called, fall into two clearly-marked sub-divisions. (*a*) Of these the first is Concrete representative emotion, or that mode of feeling which arises through an imaginative reinstatement of the original causes of an emotion. All "ideal emotion," as it has been called, *e.g.*, the secondary emotions of anger, love, fear, excited by mere *ideas* of their objects, would fall under this sub-group. There is, however, one mode of such representative feeling so well marked in its characters and so important that it may be singled out as the typical example of this variety of emotion. This feeling is Sympathy, that is, the imaginative entering into others' feelings through recallings of our own similar experiences.

(*b*) The other sub-division of the representative emotions may be marked off as Abstract, because in the most highly developed consciousness of the educated adult they involve as a constituent factor an abstract idea. These are the feelings which grow up about and colour the idea of truth, of beauty, and of duty.

These are more complex and later in their development than sympathy, and, as we shall see, they presuppose a certain development of the social feelings. They may be named the Abstract Sentiments.

The difficulties of classifying the emotions will at once be seen by referring to one or two recent schemes Hamilton (*Lectures on Metaphysics*, ii. lect. xlv.) groups the feelings into the two genera, sensations (*i.e.*, sense-feelings), and internal or mental feelings or sentiments. These last he sub-divides into contemplative and practical, and carries his scheme further by distinguishing the contemplative feelings according to the intellectual faculty concerned, and the practical according to the active impulse engaged, *e.g.*, self- and race-preservation. Dr. Bain (*Mental and Moral Science*, book iii. chap. ii.) proceeds by first marking off certain feelings, as novelty, mainly determined by change or transition ("emotions of relativity"), and then setting forth certain well-recognised "genera," more particularly, fear, anger, and love or tender emotion, passing from these as primary and original to the secondary and more composite emotions. A bolder attempt to exhibit a scale or serial order of emotion is to be found in Mr. Herbert Spencer's classification (*Principles of Psychology*, ii. pt. viii. chap. ii.). This arranges the feelings according to degree of representativeness (or indirectness of presentation) into the following stadia corresponding to those of cognition: (1) presentative feelings, *i.e.*, actual sense-feelings; (2) presentative-representative feelings, actual and revived sense-feelings; (3) representative feelings, revived sense-feelings, and (4) re-representative feelings, involving a more abstract or indirect mode of representation, as the sentiment of property. The mode of classification current in Germany is based on the distinction: (*a*) formal feelings, those not connected with any particular quality of presentation, but with the mode of interaction of presentations (including effects of relief and harmony); and (*b*) qualitative feelings, those which depend on special qualities in presentation, and are sub-divisible into sense-feelings and certain higher feelings (intellectual, æsthetic, etc.). In addition to these feelings proper, other mixed states involving an effect on conation, as fear, rage, etc., are recognised.

(1) Characteristics of Joy and Grief. The common unspecialised forms of pleasurable and painful emotion illustrate on the somatic and expressive side the contrast of pleasurable and painful reaction already dealt with. Thus, the misery of the infant when hurt, when deprived of something, when disappointed, is, roughly speaking, one and the same kind of reaction. These com

mon forms of joy and grief, happiness and misery, presuppose as excitants first of all the sense-feelings. Infantile wretchedness and gladness take their start in painful and pleasurable sensations. In the second place they involve those common modes of central activity dealt with in the last chapter, more particularly the psycho-physical processes underlying apprehension of change, also of harmony and conflict among psychical elements. Hence they presuppose a measure of representation, *viz.*, that necessary to consciousness of relation in its simplest form. Thus the feelings of deprivation and of disappointment at not getting what is offered imply a rudimentary power of retentiveness and of anticipation.

While the main characteristic of the group of emotions here referred to is this common agreeable or disagreeable complexion, they have as a subordinate factor certain more special and distinctive features, which grow more clearly manifest as development advances. Thus, the cross or vexed look of disappointment soon begins to distinguish itself from the hurt look of physical suffering.

(2) **Instinctive Emotions: Egoistic and Social Feelings.** The characteristic feature of the instinctive emotions, the manifestation of which becomes definitely marked in the first year of life, is the automatic swiftness of the reaction, and the consequent fugitiveness of the representative factor. Indeed, these 'emotions' are in many cases, *e.g.*, in infantile fondness, hardly distinguishable from a complex of sense-feelings; and in all cases the somatic reaction constitutes a main differentiating factor.

We may sub-divide these primitive instinctive emotions according as they have to do exclusively with the individual or concern others as well. In this way we get the current distinction of egoistic (or selfish) and social feelings; or, since the social feelings are other-regarding as distinguished from self-regarding, egoistic and "altruistic" feelings. Fear (of personal evil) would be an example of the former, love or tenderness towards offspring an example of the latter.

This distinction, it is to be noted, is not wholly a psychological, but a biological and ethical one. It is because of the profound

difference in the significance and purpose of the feelings, as subserving the preservation of the individual, and that of the community or race, that the distinction has become fixed in psychology.

The egoistic feelings are represented by the typical varieties, Fear and Anger. These, it is evident, have to do with individual preservation, avoidance of injury, resistance to attack. Hence they are the first to be manifested in the case alike of the child and of the animal series. Their deep-rooted instinctiveness is further seen in the difficulty which is experienced, even when civilisation and education are added, in controlling the outburst when the provoking cause acts powerfully and directly, *e.g.*, in a position of appalling danger, on receiving a personal assault.

A transition from egoistic to social feeling is supplied by the emotion known as Love of Approbation or Praise. This emotion has, indeed, been called by H. Spencer an ego-altruistic feeling. Here we have a feeling which on the one hand subserves self-preservation, for the approval of others is an element of security; and, on the other hand, by recognising a value in others' opinion, serves especially in the earlier stages of individual and of racial culture as a chief support of social institutions.

Approbation and Self-feeling. The love of others' approbation stands in close relation to what is known as self-feeling in its various forms, self-complacency, pride, and so forth. The relation is plainly seen in the great similarity of the manifestations, *e.g.*, expression of self-satisfaction, of shame and humiliation. Self-feeling is frankly egoistic, and its first germ probably appears before love of approbation under the form of pleasurable contemplation of one's body, one's actions, etc. At the same time all the higher phases of the emotion are later, coming after the love of approbation, and, indeed, developed by the aid of a knowledge of what others say and think of us. These later developments arise in close connexion with the intellectual self-consciousness already dealt with. In its most complex form, as a moral appreciation of the dignity of the individual self, the self-feeling belongs to the highest products of intellectual and emotive development.

Coming now to instinctive social feeling, we find that certain manifestations of sociality are common to the infant and to many

of the lower animals. Thus there is a feeling of satisfaction when near the parent (or the herd), and of dissatisfaction when away. We have to infer from these manifestations that there is an instinctive craving for companionship. In the case of the human offspring this feeling takes on a special display in the early and partly instinctive attachment to the mother. The relation involved in the nutrition of the child, a relation only a degree less close than that of the fœtus to the maternal organism, constitutes in itself the chief source of the feeling. Along with the supply of nutriment there goes that of warmth, support, or propping, which again is a continuation of the fœtal dependence. This first instinctive or sensuous attachment of the child grows into what we call fondness by the complication of the instinctive feeling with numerous "ideal" or transferred feelings, the product of the many pleasurable sensations, including those of the eye and of the ear, of which the mother is the source. The mass of feeling thus formed constitutes a true emotion, and one which has its own distinctive or specialised manifestation, caressing touches, etc. Modifications of this reaction enter into later forms of love.

So far we have spoken only of one ingredient in social feeling, *viz.*, fondness or liking for others' presence. This, as we have seen, is largely an outgrowth from egoistic feelings and cravings (*e.g.*, nutriment, protection). True sociality implies more than such fondness, *viz.*, sympathy or fellow-feeling.

This sympathy, again, appears in a vague animal form in close connexion with instinctive attachment. Thus gregarious animals are affected sympathetically by hearing one another's cries. The child has a kind of 'physical' sympathy with its mother. This effect may be marked off as the contagion of feeling, or as Imitative Sympathy. Such a feeling does not involve any distinct consciousness of others' feelings as *theirs*, still less any concern to lessen their sufferings. This last, the feeling of sympathy properly so called, presupposes experience and the development of representation or ideation. To this we may now turn.

(3) **Representative Emotion: Sympathy.** A true

feeling of sympathy, or 'fellow-feeling' (from Greek *σύν* and *πάθος*) only arises when we imaginatively represent and distinctly 'realise' another's affective state by help of previous similar experiences of our own. Hence the feeling in all its more articulate and refined forms is confined to the higher grades of human culture. The savage is almost as destitute of what we mean by sympathy as the lower animals. The child is singularly deficient in the power of entering into the feelings of another so as to identify himself with that person, and the development of this power comes only with the processes of social culture, including moral education.

It follows from this brief description of the feeling that it presupposes first of all personal experiences of pleasure and pain, and the ideal reproduction of these. A child cannot sympathise with his parents and others until he has accumulated a certain stock of emotive memories. Thus he must have been angry a good many times on his own account before he feels sympathetic indignation on another's account. Sympathy is thus always a revival of past feeling, and, as already suggested, one of the main typical forms of 'ideal emotion'. Hence we place it after the instinctive emotions.

Now we have seen that a main factor in each of our emotive states is the cycle of organic effects making up its so-called physical embodiment. When an emotion is reinstated by an ideational process this organic factor is apt to recur also in its original sensational form, and so lend the revived feeling a sensuous basis. Hence the well-known fact that sympathetic emotion often rises to the full intensity, etc., of the corresponding personal feeling. The sympathetic person is glad, angry, and so forth, with his friend, much as if he were personally concerned; the sympathetic actor of Lear or of Ophelia feels much as if he or she were personally overtaken by the calamity depicted. On the other hand sympathy is much more than a reproduced personal emotion. It arises through representation of another's state, which representation is in many cases an elaborate intellectual process. Thus, in order to sympathise with another, we must carry out processes

of constructive imagination, 'building up' an idea of the circumstances, of the type of character involved, and of the effect of the former on the latter. All the higher and more penetrating sympathy thus involves considerable intellectual insight, and is indeed closely akin to the *understanding* of others' minds and characters.

While sympathy and intellectual apprehension are thus closely related, they are not identical. In each case there is the representation of another's mind or feeling, but the mode of representation differs. In sympathising with a person we are occupied with his feelings as such, and are ourselves in a like emotive state; in understanding him we are intellectually active, fixing our attention on the *relations* (causal, etc.) of his mental state. Hence we can often understand passions and impulses, *e.g.*, a homicidal hate, without a full sympathetic realisation of them.

Sympathy, though primarily a feeling, stands in close organic connexion with active impulse, *viz.*, the desire to further the happiness of others. We may be momentarily affected by another's suffering without bestirring ourselves to relieve it; but if sympathy gains a firm hold on us it tends to work itself out into beneficent effort. This tendency is plainly seen in the complex psychical state known as pity or compassion, which always involves a nascent impulse to console, if only by a word. This active phase of sympathy is recognised by moralists under the head of benevolence, disinterestedness, altruism.

The development of sympathy follows certain lines answering to special interests and directions of attention. The child begins to sympathise with those animals and human beings with whom it is habitually thrown. Liking, or fondness, is a great determining factor in sympathy: we can all sympathise most readily with those whom we like. This truth is sufficiently illustrated in all the familiar language of the social feelings; for 'love,' 'affection,' and so forth, clearly include liking *and* fellow-feeling. Thus the child's love for the mother is never merely an egoistic feeling, *i.e.*, a reflex of personal satisfaction, but includes from the first an element of instinctive or imitative sympathy; and under normal conditions this blind instinct develops later into a true conscious sympathy.

In its later and more comprehensive forms sympathy detaches itself from personal liking and grows into an independent sentiment, *viz.*, that of humanity. Here we have an impulse to enter into human experience as such, apart from the attractive or repellent character of the particular subject. Such a wholly non-personal or 'abstract' sentiment of humanity, though it is approximated to in the philanthropy of a Howard, is never perfectly attained.

(4) **The Abstract Sentiments.** Sympathy, though a representative feeling, is eminently concrete. In order to sympathise there must be a real living creature, or at least its fictitious imitation. The excitants and objects of sympathy are concrete psychical states in particular individuals. It is only in its later and more subtle form, the feeling for humanity in general, that we discern a tendency to take on something of a general or abstract character.

This tendency in feeling to transfer itself from a concrete to an abstract form of representation is seen still more clearly in the case of certain emotions which we have marked off as abstract sentiments. Philosophers have long since familiarised us with the notion that there are three main types of objective worth or of ideal end, which are valid for all minds alike, and answer to the three main directions of mental activity. These are: Truth, the objective correlate of intellection; Beauty, the objective correlate of feeling (in its purest form); and what the ancients called the Good and we moderns usually envisage under the narrower aspect of the Right, the ideal end of human action or endeavour. Corresponding to each of these abstract ideal conceptions there is a peculiar feeling. Thus we commonly speak of the love of truth, or knowledge, the feeling of the beautiful, and the sentiment of duty. These feelings are known as the logical, the æsthetical, and the ethical sentiment.

The general characteristic of these sentiments is that they are highly representative, the outcome of complex processes of combination and transference. As such they are far removed from the instinctive emotions, and are wanting in the energetic manifesta-

tion, and in the well-marked organic resonance of these last. The term "sentiment" as distinguished from "emotion" appears to indicate this quiet, contemplative character of the whole mental attitude.

Since these feelings in their fully-developed form presuppose considerable representative power, and some progress in abstract thought, we shall expect to find them appearing late in the development of mind. Germs of the feelings do indeed show themselves far down in the evolution of the individual and of the race, and are even to be observed in the lower animals. Thus the æsthetic feeling has its humble root in that sensuous delight in colour and tone which the baby shares with birds and other animals. But it is only in the higher stages of human life that these sentiments take on their richer and more complex form. As feelings attaching to objects of common worth they presuppose, indeed, the development of social life and of the higher human interests. In the case of the race and of the individual alike, the love of truth, the sentiment of duty, and the feeling for the beautiful, are only developed when the sphere of egoistic feeling has been transcended, the sympathies awakened and deepened, and so a large enjoyment in common rendered possible.

(*a*) **The Intellectual and Logical Feelings.** By the logical, or, as some call it, the intellectual sentiment, is meant in its most general signification that group of feelings which accompanies the intellective processes *as such*, and which culminates in the love of knowledge or of truth.

Here, it is obvious, we must not look, at least in its ordinary manifestations, for any of that emotive excitement or agitation which we find in the case of the instinctive emotions. The logical sentiment, just because it is feeling bound up with intellectual processes, which as such necessitate a certain calmness of mood, is a tranquil affective state.

It may be said in general that intellectual activity only yields a considerable feeling of enjoyment when the common conditions dealt with above, *viz.*, quantity of activity, contrast and relief, and harmonious adjustment of opposing elements, are present in a

marked degree. The carrying out of the intellectual processes, the intenter acts of observation, the search for ideas, and so forth, are commonly accompanied by disagreeable concomitants—a feeling of strain, of difficulty, of obstacle to movement. Hence, though the quest of truth has its own peculiar delight, this comes mostly as a reward for a previous endurance of disagreeables.

Intellectual feeling is in the main an example of that common manifestation of joy and sorrow, elation and depression, already dealt with. It is only in those cases where a special attitude of attention, and as the concomitant of this a particular group of muscular effects, are involved that we get a characteristic physical embodiment, as in the look of wonder, the well-known manifestation of mental perplexity, and so forth.

The simplest manifestation of an intellectual feeling meets us in the attitude of surprise. The feeling of surprise reaches some way down in the scale of animal life, and is one of the first emotions which are distinctly manifested by the child. The immediate effect here is a disagreeable feeling, mental shock or disturbance, due to a sudden presentation of something for which attention is not prepared. A secondary effect is the calling forth of a self-preservative reaction, *viz.*, the intensified look by help of which the strange, unexpected object becomes clearly apprehended. This intensified attention, which gives the characteristic expression, is the source of agreeable feelings, first of heightened activity, then of relief, of self-readjustment, and of intellectual mastery.

If, instead of being merely unexpected at the moment, the object is strange and unfamiliar, the feeling of surprise passes into the more prolonged state of wonder or astonishment. Here we have new affective elements, growing out of nascent processes of reproduction and comparison. Thus when we are astonished at a strange or rare phenomenon, as an eclipse, we are affected by the fact of novelty or of rarity. This realisation of something new and extraordinary is in itself exhilarating, and, under favourable circumstances, we find wonder manifesting itself as a distinctly

pleasurable elation involving an energetic and prolonged reaction of attention.

The bare feeling of wonder does not amount to an intellectual emotion properly so called. Indeed, since the excitement of wonder depends on the mystery of the phenomenon, it may readily oppose the process of intellectual assimilation or understanding. This is what happens whenever the love of the marvellous so intoxicates the vulgar mind as to lead it to resent a scientific explanation of occult natural phenomena. At the same time, the feeling of wonder, through the preternatural reaction of attention or mental fixation called forth, is on the whole a powerful stimulus to inquiry. The impulse to "take in," assimilate, or comprehend becomes specially excited in presence of what is strange and foreign to our minds. And, as a matter of fact, we find, in the evolution of the race and of the individual, curiosity developing into a strong and effective impulse of inquisitive search as a reaction on some new wonder-exciting presentation.

The intellectual feeling proper, that is, the feeling attending the process of intellection, only grows distinct when curiosity or the desire for knowledge is sufficiently developed to prompt to a prolonged effort of search. Here it takes on the form of a delight in intellectual pursuit for its own sake, the feeling known to the lover of witty talk.

Along with this general pleasure in intellectual activity there are special moods of gratification corresponding to the different functional activities of intellection. To see the real point of difference between two things, to connect an event with its concomitants in time, brings its peculiar satisfaction. Of these special varieties of intellective pleasure the most considerable is that which attends the workings of assimilation. To wake up to a resemblance between two things hitherto kept apart by our mind is always agreeable; and in the case of such far-reaching strokes of assimilation as scientific law and poetic simile present to us, the revelation may affect us with the exhilaration of a joyous surprise.

The pleasure derived from assimilation is closely akin to the

logical satisfaction of harmonising our ideas. Here, as pointed out above, the starting-point is the sense of logical antagonism or contradiction between facts or our apprehensions of these, the pleasurable feeling of consistency and unity coming in on the removal of such discrepancies. This logical sentiment of consistency is the highest form of the intellectual feeling, appearing only as the result of special intellectual culture and logical self-discipline.

(*b*) **The Æsthetic Sentiment.** The second of the Abstract Sentiments, variously called the feeling for the beautiful, the pleasures of taste, and the fine-art sentiment, includes a group of feelings having a marked degree of pleasurableness, and constituting indeed one main source of the more refined enjoyment of human life.[1] Although, as we shall presently see, they have their root in certain simple sensuous effects which appear in the earliest stages of human culture, and even in animal life they constitute in their fuller and more complex form emotions of a highly representative grade which are confined to civilised communities and to the upper levels of culture.

The enjoyment of what is beautiful differs both in the mode of its origin and in its psychical features and accompaniments from the feeling for knowledge or truth. It is a fuller, or deeper pleasure, freer from disagreeable elements, and more of a luxury. In seeking knowledge we are aiming at something more or less directly *useful*, and we find the pursuit in certain of its stages arduous and even painful. In giving ourselves up to the beauty of a natural scene, or to the charms of music, we have done with all thought of utility, and are seeking enjoyment as children seek it in their play, for its own sake. Or, as some modern writers have it, æsthetic pleasure is the accompaniment of play-like activity, that is to say, activity not used up in carrying out

[1] Of course, the æsthetic sensibility is like other sensibilities, two-fold, including not only the agreeable effect of beauty but the disagreeable effect of the 'un-beautiful,' if one may coin a word, that is, the ugly. Only as art aims at the realisation of the former, we naturally give this aspect the prominence.

the necessary (self-preserving and race-preserving) functions of life.

What is commonly understood by beauty appeals to us through one of the two higher senses, sight and hearing.[1] And the pleasure produced is wholly due to the particular grouping of sense-impressions supplied, together with certain suggestions which these excite immediately in the minds of all spectators alike, such as the health suggested by a rosy cheek, or the force expressed by a cataract. In other words, the pleasure arising from an impression of beauty is wholly the outcome of the attitude of *contemplation:* and as such is *disinterested*, that is, free from reference to self and its concerns. Thus a mother's delight in looking at her child, *so far as it depends on the consciousness of its being hers*, is excluded from the category of properly æsthetic pleasure.

From these conditions of æsthetic pleasure flow some of its most valuable characteristics. Of these the first is its prerogative as pleasure. The enjoyment of the beautiful is, among all our pleasures, the purest and the richest in respect of the variety of its elements, and this peculiarity seems to be connected with the particular channels of sense employed. The higher senses, as compared with the lower, are, as we have seen, free from disagreeable elements. Not only are they wanting in such unpleasant antecedents and consequents as the craving and the satiety which mar the enjoyments of appetite, they are relatively weak in painful elements. With this purity of delight there goes special fulness and richness, that is, variety and complexity of pleasure. This is in part connected with the rapid recuperation of the higher sense-organs, and their susceptibility to *prolonged* stimulation without loss of functional vigour or the disagreeable sense of fatigue. The quiet contemplation of the world of sights, and in a less obvious degree that of sounds also, is an entertainment which we can take up and prolong as we will. In addition

[1] The close connexion of the æsthetic sentiment with the senses is seen in the etymology of the name (from Greek αἴσθησις, sense-apprehension).

to this prolongability of the higher sense-pleasures there is the important circumstance that both sight and hearing supply not only a wide variety of pleasurable sensuous effect, colours, tones, but offer peculiarly favourable conditions for the pleasurable appreciation of harmonious relations among their elements.

As a second main distinguishing characteristic of æsthetic pleasure we have its high degree of *shareability* or range of participation. The delights of art are common forms of enjoyment. This feature, too, is explained by a reference to the determining conditions. Thus it is noticeable that the two senses concerned are precisely those which, being acted upon by objects at a distance (and not, as in the case of touch, by objects in contact with the organism), can be simultaneously stimulated in the case of a number of persons by one and the same objective stimulus, as when an assembly watches the same dramatic spectacle, or listens to the same musical performance. Again as accompaniments of the attitude of disinterested contemplation the pleasures of beauty and art lend themselves, best of all pleasures, to a wide and impartial distribution, and to the deepening and enriching effect of mutual sympathy. We may indeed say that art-pleasures are the most valuable of all our social or common enjoyments.

As already suggested, æsthetic pleasure is highly complex. Its main constituents may be conveniently grouped under three heads. (1) Of these the first may be called the *sensuous* or material element, that is, the pleasurable aspect of the sensations involved. The enjoyment of bright light, of lustre, of the various gradations of colour, of the linear elements of form, also of musical tone, and of the allied effects in articulate sound, forms a fundamental portion of the delight in beautiful objects. The large scale of sensational quality supplied by colours and tones gives to the sensuous element in the impression of art a special value. Indeed it may be said that not only in the earlier stages of æsthetic development, but throughout, the sensuous effect is the basis of all æsthetic enjoyment.

(2) As a second constituent we have the relational or *formal* element, that is, the agreeable effect due to certain modes of

grouping the sensuous elements. The æsthetic value of such grouping depends on a union of the two principles already pointed out, variety, including contrast, and harmony, or peaceful co-ordination of diverse elements. Such a satisfying arrangement of elements may have to do with relations of sensuous quality, as in the harmonious distribution of colours, the melodic and harmonic combinations of tones: or it may concern itself with agreeable distributions of material in the forms of space and time, as in the effects of symmetry and proportion in the visual arts, and in the rhythmical arrangements of melody and verse.

(3) In the two constituents already considered, we have been occupied with the presentative features and relations, or what has been called the "direct" factor in æsthetic impression. In addition to this there is the *re*-presentative, or "indirect" factor. This consists of that large and important part of the æsthetic effect which arises from association, suggestion, or the play of imagination. Thus it will include the ideal suggestions of the several varieties of colour and tone themselves, also the common associations of concrete objects, as of the fragile maiden-hair fern, the sublime Alpine crag; further, the *expressive* significance of presentations, as the utterance of life and feeling in tones, natural or musical, and in a less obvious manner in the colours and forms of objects, as seen in the sentiments attaching to the pale lily, glowing rose, and so forth; and finally, all the emotive effects connected with the ideational processes excited, the group of effects specially marked off as the pleasures of the imagination.

The growth of the feeling of beauty follows, to some extent, the order of our analysis. In the evolution of the race and of the individual, the feeling for bright colour precedes the delight in symmetrical form, and the ideal or associative element, so far as it involves experience and reflexion upon this, appears latest of all. It follows, too, from our brief analysis, that the æsthetic feeling will grow in complexity as the mind develops on its intellective and emotive side. Thus a finer, more discriminative eye or ear brings with it a larger and more various enjoyment of colour or tone effects; and a stronger grasp of relations and a

finer measurement secures a fuller and a subtler appreciation of proportion, of rhythm, and so forth. Lastly, widening experience and deepening knowledge will serve to invest objects with a richer suggestiveness. The effect of such ideational accumulation is very apparent in all the higher effects of modern art, which appeals to a knowledge of history, of literature, and even of the laws of nature.

(*c*) **The Moral Sentiment.** As the third main variety of abstract sentiment we have the moral or ethical sentiment. By this is meant the feeling which attaches itself to the idea of right or duty, and is commonly spoken of as the sense of duty, or of moral approbation and disapprobation; and, in one of its most important manifestations, as conscience.

Here, it is at once evident, we have a feeling which, while on the same level of development as the other two sentiments just examined, presents marked differences from these. In its common form, approval of what is right, disapproval of what is wrong, the sentiment has something in common with the æsthetic feeling. Like this, it is excited by a contemplation, purely disinterested (*i.e.*, free from all reference to self and its interests), of certain attributes or relations in given objects. We are immediately pleased when observing or imagining a morally good action, just as when we are observing or imagining a beautiful object. Yet the exciting quality and the resulting feeling are widely different. Moral approval or disapproval differs from æsthetic in that it always fastens on a human action, whether another's or our own, and on that particular aspect or relation of the action which we call its rightness or wrongness. It is thus pre-eminently a *practical*, *i.e.*, action-controlling, feeling.

Again, the moral sentiment is *regulative* or magisterial, having as its essential characteristic a consciousness of claim or obligation. Other practical feelings, *e.g.*, the egoistic feeling of ambition, are wanting in this distinctive feature. It may be added that as a regulative judicial feeling the moral sentiment is inferior in pleasurableness to the æsthetic, being indeed much more intense on its painful side (moral *dis*approbation).

One characteristic remains to be noted. The moral senti-

ment is pre-eminently a *social* sentiment. The social consciousness, the feeling of solidarity of the self and the community, is still more distinct and prominent in moral approbation than in æsthetic admiration or intellectual gratification. To feel the claims of duty is to realise in a peculiarly clear manner our relations to the community.

The moral, like the æsthetic, sentiment is a product of various constituent feelings. Thus, to begin with (1) What we call morality, though essentially a social feeling, has one of its roots in the *egoistic* feelings. The individual's regard for others, his desire to do his duty by others, presupposes the instinctive, self-preserving impulses dealt with above. Thus the peculiar feeling of condemnation of a wrong action can be traced down to the instinctive reaction of a purely individual or egoistic resentment. (2) Next to this instinctive base in the egoistic feelings we have as an important contributing element the semi-social (ego-altruistic) feelings, *viz.*, the regard for others' opinion, the dislike of blame, and the love of praise. This is a powerful aid to morality, especially in the early stages of moral development, alike in the race and in the individual. (3) The highest element in the moral sentiment is sympathy, that is, regard for others' welfare for its own sake. Since morality is concerned with others, with the needs and claims of our fellow-creatures, it is evident that a disinterested regard for it implies the existence of this purely social feeling of sympathy. Hence we never find the moral sentiment developing when the social feelings are wanting.

The feelings just enumerated would not of themselves constitute a sense of *duty*. As already remarked, the peculiar shade of sentiment indicated by this expression involves the recognition of an external or objective claim. Such a claim asserts itself and makes itself felt in the first instance, alike in the history of the race and of the individual, through what we call authority, or the imposition of commands by a superior will (that of the tribal chief or head, of the parent).

The evolution of the moral sentiment follows a similar course in the case of the race and of the individual. Confining our

attention to the individual, we find a certain basis for morality in the instinctive feelings of the child. Thus, as we have seen, the child has an instinctive tendency not only to seek others' society, but, what is far more important in the present connexion, to desire the good opinion of others. These constitute in themselves a natural bias towards morality. When normally circumstanced, moreover, *i.e.*, educated in a home, he finds himself acted upon by a system of government or authority with definite commands, backed by punishments and rewards. These will operate, in the first instance, on his egoistic feelings. He does what he is told in order to avoid the pain of punishment, or to earn the promised reward. At the same time, this apparatus of authority gives a definite direction to the instinctive workings of his social or semi-social impulses. Thus the innate impulse to win others' approval becomes fixed and in a measure moralised, as a desire to carry out lines of action uniformly approved by those whose good opinion is sought. In this way a sentiment of reverence for command or law is to some extent developed.

This crude, indistinct feeling of reverence becomes clearer as experience widens, the social feelings proper, *i.e.*, affection and sympathy, expand, and individual reflexion is added. Thus the growth of a feeling of affection for and of trust in the parental governor will lead the child to take his commands as something acceptable or good. In the early stages of moral growth, when obedience is very much respect for a particular person rather than for an abstract law, this force of affection counts for much. Hence the importance of early home-training in morality, when the source of commands is also the person fitted by his or her other relations with the child to call forth his first warm affection. In order, however, that this feeling may become a true respect for morality as such, the general validity of the commands upon the child must be recognised, and this recognition comes by living with others under a common customary rule.

The last stage in this development is reached when the grounds of such uniform subjection to law begin to be understood. Here the growth of sympathy and of rational reflexion is

all-important. It is when the child enters into others' feelings that he sees *why* he has to do this action as right, and to abstain from that action as wrong. As was shown above, it is sympathy which brings home or makes real to each of us the existence of our fellow-creatures with feelings, interests, and aims like our own. Hence it is by a growth and expansion of sympathy that the child comes to grasp the social bearings of his actions, as the injury he does another by an explosion of anger, by an underhand trick, and so forth. It is by a like expansion of sympathy that he comes to feel hurt when somebody else does an injury to another.

It is evident, from this brief sketch of the development of the moral feeling, that, like the intellectual and the æsthetic sentiment, it presupposes a considerable growth of intelligence. Mere feeling, apart from thought, would not yield the moral sentiment or moral consciousness as we know it. The "sense" of duty is a product of egoistic and social feeling with processes of reflexion and comparison added. It is by the more complex apprehension of others' feelings, others' desires 'along with my own,' and by careful measurement of the several claims of this, that, and the other person, that all the higher and more refined forms of moral sentiments become possible.

The Culture of the Feelings. We have seen that in the history of psychology feeling has been very much ignored and has only recently been erected into a main constituent of mind. As a result of this we find that in the counsels given to men for the direction of their own and others' minds, while much has been written on the conduct of the understanding, and on moral discipline, comparatively little has been said respecting the culture of the feelings. Nevertheless, it is coming to be recognised that the fostering of the higher forms of feeling, *viz.*, the emotions, constitutes an important branch of self-culture, as also of the education of the young.

The peculiar place and function of feeling in the economy of mind suggest that the end of emotive culture will be a complex or many-sided one. Thus, owing to the organic connexion of feeling with intellection, and the dependence of all intellectual

activity on *interest*, the development of the feelings in certain directions enters into all that is commonly called intellectual training. Even the comparatively cold processes of scientific observation are sustained by powerful, if tranquil, currents of emotion. Still more obviously is the culture of feeling attached on another side to moral discipline. Indeed, it is under this head that the education of the feelings (more particularly the social and the moral) has commonly been treated. At the same time no conception of emotive culture is adequate which does not regard the feelings as having *their own intrinsic value*.

Feeling as pleasure and pain is the raw material of our happiness, and as such deserves special attention. In the measure in which our emotive sensibilities correspond with the circumstances of our lives, are we likely to be happy or the opposite. The idea of the intrinsic worth of feeling has grown distinct in our modern ideals of life with their tendency to emphasise the *subjective* aspect of human experience. A large range of refined feeling is now recognised as one main essential in a fully developed and cultured mind.

Now we have seen that feeling, whether considered on its own account or in its connexions with the other mental functions, has very unequal value according to the form which it assumes. Thus, all violent and excessive feeling or passionateness, a leading feature of the animal and the undisciplined child, is hurtful in a number of ways, interfering at once with physical health, with calm logical reflexion, with that equability of temper which is a main condition of happiness; being further an unlovely spectacle to others, and incompatible with the ideal of a beautiful well-regulated mind. Again, the earlier lower feelings, especially those connected with bodily appetite and the instinctive passions, have a lower value from the point of view of individual and of moral well-being alike than the representative emotions. They are, moreover, precisely those which owing to their powerful organic basis are apt to run into violent excess. Hence one part of the management of the feelings concerns itself with a due control of passion and appetite. This *negative* side

of feeling-culture depends directly on the strengthening of intellect and will in those processes known as self-control, a matter to be dealt with later on. The *positive* branch of feeling-culture aims at developing and deepening the higher and more tranquil and intellectual feelings, *viz.*, the emotions of [illegible] art, etc. It is by the growth of these more refined feelings and the related interests, as companionship, literature, humanitarian effort, that the individual best escapes from the primal tyranny of the egoistic passions. What we more particularly mean by a refined mind is one which seeks its pleasure in connexion with these intellectual and human interests rather than in the satisfaction of animal impulses.

So much as to the end of emotive culture. With respect to the means to be used it is much less easy to be definite. Feeling is a side of our nature which seems at first sight to refuse to lend itself to the agencies of culture. Whether a man is sympathetic, finds enjoyment in the beauties of colour and tone, and so forth seems to be a matter of organisation and temperament rather than of education. No doubt the organic basis of feeling is a great limiting condition of all emotive development. Yet feeling, like the other functional activities of mind, is susceptible of improvement by exercise, and, as we have seen, develops through the action of experience and association, supplemented by inner processes of reflexion.

In aiming at developing feeling in oneself or in another we naturally begin by supplying *the necessary external conditions*. Thus, the feelings which attach themselves to others, *e.g.*, emulation, affection, are developed by daily companionship. If we want to be sociable we must live a social life. In like manner, a youth who is to enjoy the manifold beauty of things must be brought under its spell, that is to say, surrounded by beautiful objects. We all know the powerful effect of a tasteful home on the æsthetic feelings of children. Among these external conditions or excitants of feeling a prominent place must be given to *the manifestations of feeling in others*. Children, through the mechanism of imitative sympathy, are wont to take on those

modes of feeling which they find expressed by those about them, and all of us tend to react most simply and powerfully in directions corresponding to the customary emotive manifestations of our surroundings.

A second chief agency in this education of the feelings is *the carrying out of the involved intellective processes.* Since all the more complex and refined forms of emotion are bound up with processes of observation and reflexion, we may further the growth of these feelings *indirectly* by suitable intellectual exercises. Thus we may improve our capacity to enjoy art and literature by exercising our minds in singling out and attending to the features which give them their æsthetic value, as the constituents of beautiful form, the special directions of imaginative activity involved, say in a sublime metaphor. Such effort at emotive culture should further be aided by careful study of what others have seen in these works, of the writings of those who possess the gift of æsthetic insight, and, further, the philosophic faculty of laying bare the *general* principles on which all normal æsthetic impression depends. Such a study of the best criticism on its appreciative and its analytical side will help us further to form our *standards* of tastes, and so to carry out better the processes of æsthetic judgment. Similar considerations apply (*mutatis mutandis*) to the cultivation of the moral sentiment and judgment.

REFERENCES FOR READING.

On the nature and classification of the emotions the reader may consult Hoffding, *Outlines of Psychology*, vi. C.; W. James, *Psychology*, ch. xxiv. A more detailed account will be found in Bain's treatises, *The Emotions and the Will* and *Mental and Moral Science*, bk. iii.; and in my work, *The Human Mind*, vol. ii.

PART V.

CONATION OR VOLITION.

CHAPTER XIV.

VOLUNTARY MOVEMENT.

We have now surveyed the principal stages in two out of the three directions of psychical development. It remains to carry out a similar process in the case of the third direction, that of conation or volition.

Definition of Conative Phenomena. The phenomena coming under the head of conation or volition have already been roughly marked off (*cf.* pp. 32, 33). They include what are specifically known as our *active* manifestations. To begin with, they comprehend what we commonly mean by our actions, that is, the movements carried out by our 'voluntary' muscles. The movements of the organism, so far as unconscious, are of course excluded from the class of psychical phenomena. Omitting these, we may say that in a broad sense the terms conation, volition, cover all actions which have a conscious accompaniment, and which may be marked off as *psychical* actions. Thus instinctive movements find their place under conation. In a narrower sense the terms refer more particularly to that group of more complex psychical actions which involve an *antecedent purpose*.

Besides the (psychical) movements of the bodily organs cona-

tion includes the processes which fall under the head of attention Here, as pointed out above, we have, just as in the case of movement, a lower non-purposive and a higher or purposive form.

The most obvious common characteristic in this variety of actions or conative processes is, as already suggested, that peculiar element which is best marked off as *active consciousness*. To move the limb consciously, to direct attention on a difficult point, is to have a particular and unique sort of experience, the *differentia* of which we can only describe by help of the term active, or some equivalent expression, as sense of exertion, or of effort. As suggested above, the peculiar colouring of these active psychoses is probably in all cases connected with the working of the motor side of the nervous system. This applies not only to voluntary movement, but to acts of attention, which, as we saw, include a motor concomitant (*cf.* p. 82).

Besides this factor of active consciousness all the more complex processes of volition to which we commonly apply the term voluntary, as 'voluntary action,' 'voluntary attention,' connote other ingredients as well. These consist of psychical *antecedents*, that is, mental processes preceding, as well as those accompanying the action. This antecedent factor may in general be described as a *forecasting or prevision of the action itself, and of some at least of its results under the form of an 'end'*.

Conation in its Relation to Feeling and Cognition. The *differentiæ* of conative phenomena now reached, *viz.*, active consciousness and psychical initiation through representation of an end, may enable us to mark off with greater distinctness the domain of volition from that of intellection and of feeling. A word or two may serve to make this plain.

Taking feeling first of all, we see that conation contrasts with this by reason of its *activity*. Pleasure and pain are passive states. It is true, as has been shown above, that all feeling has motor concomitants which contribute psychical elements to the emotive state. Yet *quâ* mere feelings they are wanting in the peculiar consciousness of exertion, as also the characteristic element of purpose. Feeling, though involved as an antecedent condition in

conation, only leads on to this by assuming a new form, *viz.*, *desire*, *e.g.*, desire for the gratification of appetite, of literary taste.

In like manner our *differentiæ* serve, in general, to mark off conation from the region of intellection. Our mental processes are intellective in so far as they make the presentative side of our experience prominent, and involve processes of discrimination, association, etc. They are conative in the measure in which active exertion preceded by desire or idea of end becomes dominant

A special difficulty in marking off conation from intellection arises from the circumstance that every psychical action has an intellective phase. Thus the active consciousness as muscular sensation can, in the way shown above, be discriminated as that answering to a particular kind of movement, and retained and reproduced for future use. Further, as we shall see by-and-by, just as what we call intellection is always accompanied by the conative phenomenon attention, so the processes of voluntary movement involve an intellective factor, *viz.*, the *representation* of a movement, etc.

As has been pointed out, the conative process follows one of two directions commonly distinguished as voluntary movement and attention, or, as they are sometimes loosely called, 'external and internal' action. We have already found reason to see that these are not absolutely distinct processes, and this conclusion will become clearer as we advance. At the same time, the distinction offers a convenient way of dealing with the subject. We will accordingly begin by studying volition in its connexion with movement, and take up the volitional control of attention at a later stage.

Roots of Voluntary Action: Instinct and Experience. A glance at what we mean by a voluntary action shows us that it presupposes two factors. The first of these may be marked off as the Original or Instinctive root of volition. Such is the impulse to seek that which is agreeable and beneficial, and to avoid what is painful and harmful. This impulse to action or active disposition is primordial, and has to be presupposed in any attempt to account for the growth of the volitional process. It shows itself, first of all, in a sub-conscious form, in what is sometimes specially marked off as *Impulse* (German "Trieb"),

that is, a rudimentary and essentially vague process of craving, or striving. In its later and clearly conscious form it becomes what we know as *Desire*.

In the second place, a voluntary movement, *e.g.*, of the arm for the purpose of plucking fruit, presupposes experience. A child brings with it into the world no prophetic prevision of its doings and their results. Before he can consciously direct a movement to a particular result, there must have been some experience (or series of experiences) by which he has learnt first of all the particular result which he now aims at; secondly, the particular conscious movement which he now wills to carry out; and thirdly, the (causal) connexion between these two. It follows from this that a completely voluntary movement is preceded by earlier forms of movement. These earlier movements may be marked off as Primitive Movements.

It was pointed out above that the development both of intelligence and of feeling proceeds from the outer life of sensation to the inner life of ideation. The course of volitional development is similar. In the earliest stages of this development we shall find movements called forth in immediate response to sensations, and involving as their psychical concomitants only *sensational* elements (muscular sensations, etc.). Little by little this crude form of movement will be seen to be complicated by *ideational* processes, representations of desirable object, and of appropriate action, till in the highest type of volition this internal ideational factor assumes the supreme *rôle* under the form of deliberation and rational choice.

We may now proceed to trace this movement of volitional development, beginning with an account of those primitive movements which precede the distinctly volitional type.

Primitive Movements. (*a*) Movements not Psychically Initiated: Random, Automatic Movements. As we saw above, the general type of motor action is reflex, *i.e.*, following on sensory stimulation (*cf.* p. 22 f.). At the same time there is some reason to suppose that in the case of the child, as well as of other young animals, a certain number of move-

ments arise independently of sensory stimulation, and through what has been called the "automatic" excitation of the central substance.[1] They have been variously called Spontaneous, Automatic, and Random movements. Illustrations of this class appear to offer themselves in the movements of the chick in the egg, and in some of the earliest movements of the infant, as stretching out the arms, the legs, rolling the eyes on waking while the lids are still closed, and so forth.

Assuming the existence of such movements, we see that their most striking psychical characteristic is the absence of all psychical initiation. They are preceded by no anticipatory consciousness, either of the movement itself, or of anything resulting therefrom. Accordingly they only claim a place in a psychological account of movement by reason of the active consciousness or motor experience which they yield.

(*b*) **Sensori-Motor Movements: Conscious Reflexes.** The common form of the lower class of movements is, as we have seen, the reflex or "sensori-motor". Many of these, *e.g.*, the spinal reflexes (see p. 23), are supposed to be purely physical, that is, unaccompanied by any form of consciousness. Others involving the psychical centres in the cortex are attended with consciousness, both the sensory and the motor stage of the process giving rise to sensation more or less distinct. Such are the movement of closing the eyelid when an object is brought near the eye, and of starting at a sound. These may be called *conscious reflexes*.[2] These conscious reflexes differ, as already implied, from automatic movements in the important circumstance that they have at least a rudiment of consciousness as their antecedent, and so are *psychically initiated.* In this respect they bear a certain resemblance to *voluntary* movements, for, as we shall see, these last

[1] The nature of this automatic stimulation is wholly unknown. The common hypothesis is that it is due to certain changes in the composition of the blood in the capillaries permeating the brain-substance.

[2] Some writers distinguish the unconscious from the conscious or psychical reflexes by calling the former 'excito-motor,' the latter 'sensori-motor'. I use the term sensori-motor so as to include all reflex actions.

commonly have a sensation or its ideational representative as an initiative factor. At the same time, these conscious reflexes are distinctly marked off from true volitional actions, first of all, by the absence of all idea of purpose or end, as well as of movement; and, secondly (what is closely connected with this), by their unvarying mechanical character—*the same motor response always occurring when the particular sensory stimulus recurs.*

Some reflex movements are perfect, or approximately so, at birth. This applies to the necessary actions of inspiration and expiration, swallowing, and the like, which, as we have seen, are commonly carried on by means of sub-cortical centres, and do not involve distinct consciousness at all. It applies also to more distinctly conscious reflexes, as, for example, closing the fingers over a small object, as a pencil, brought in contact with their anterior surface. Others require a certain amount of experience and so first occur later. This applies to many movements of the eyes, *e.g.*, turning them towards a light.

It is to be added that, in addition to such original reflexes, acquired voluntary movements themselves tend by repetition and the lapsing of the element of conscious purpose to take on a reflex character. Many of our demonstrably acquired movements, *e.g.*, brushing away a fly from the face, putting out a hand to stop an object approaching us, offering our hand in response to the invitation of another's outstretched hand, have this reflex or sensori-motor character.

In addition to these restricted and specialised reflex reactions there is a more diffused form of motor reaction of the same reflex type. Thus it has been proved by recent experiments that every sensorial stimulus tends, according to the degree of its strength, to innervate the muscles generally. This diffused form of reflex motor reaction is, as we shall presently see, important as supplying unformed material for volitional selection.

(*c*) **Instinctive Movements.** Closely allied to conscious reflex movements, and not easily distinguished from these, are a third group of primitive reactions, *viz.*, instinctive movements. In a sense all original *unacquired* movements determined by con-

genital organic arrangements are instinctive, and the word instinct is often used in psychology with this wide reference. In the narrow and stricter sense, however, "instinctive movement" stands for one particular variety of the primitive sensori-motor type of reaction. These instinctive movements are, physiologically considered, distinguished from what are known as "reflexes" by their complexity. Many of the instinctive actions of the lower animals, *e.g.*, the building instinct of the beaver, are complicated series of movements. This applies even to such an apparently simple instinct as sucking.

Psychologically considered, instinctive actions are characterised not merely by the richer active consciousness which this motor complication implies, but also by *a fuller and more important psychical initiative.* In the case of many conscious reflexes the psychical concomitant is, as was remarked, indistinct and fugitive. It is otherwise with instinctive movements. Many of these at least are preceded by sensations of considerable intensity. Moreover, and this is a capital distinction, the sensational element in the initiation of instinctive movements has a marked *affective* concomitant. Thus the instincts of birds *e.g.*, incubation, migration, appear to be determined by sensations having a strong accompaniment of painful feeling, *viz.*, one of discomfort or distress, which element comes distinctly into view whenever the appropriate movements are not at once forthcoming. A striking illustration of this is seen in the instinctive appetites, as hunger, thirst, and probably also the craving for sleep.

Instinct is marked off from a mere state of feeling by its active element. By this is meant that peculiar and energetic stir of muscular activity which arises during the state of hunger or other discomfort and which appears to indicate a vague craving or striving after something not realised at the moment.

Instinctive movements are further characterised by the aspect of *purposiveness.* They show much more distinctly than reflex movements a biological utility or adaptation to life ends. How far in addition to this biological purposiveness there is

a psychological purposiveness, *i.e.*, *consciousness of end*, is a matter of great uncertainty. It is possible that they have a rudimentary analogue of this in the form of blind impulse, *i.e.*, a vague sense of something wanting, and of a striving to satisfy the craving; yet the nature of the purposes served by many of the instinctive actions of the lower animals, *e.g.*, provision beforehand for the needs of offspring, forbids our supposing that there can be any idea of the particular end present.

It has been customary to assign instinct to the lower animals, and to attribute the actions of man to intelligence. Yet, though the part played by instinct in the life of the child is smaller than it is in the life of the young animal, it is larger than has been generally supposed. The instinctive factor in human action includes a few specialised and perfected instincts, such as sucking. For the most part, however, it appears under the form of an original organically conditioned impulse or tendency of a more or less vague character, requiring the specialising influence of experience and education. Such are the instinctive promptings to movements of the arm and hand in grasping, of the legs in walking, of the vocal organ in the first infantile "la-la-ing," and so forth.

In dealing with emotive reactions under the form of expressive movements we saw that they involve movements carried out by the so-called 'voluntary' muscles, and further, that they are conditioned by congenital nervous arrangements. In these respects, as also in the obvious circumstance that they are preceded by feeling, we can see that they have a close affinity to the group of instinctive movements. At the beginning of life, more particularly, before the conative and affective manifestations have become clearly differentiated, the regions of instinctive and expressive movement are not easily marked off one from another. Thus the crying of the hungry infant seems at once the expression of distress, and the effect of a *quasi*-conative impulse, the craving begotten of appetite.

Genesis of Voluntary Movement. The various groups of primitive or unacquired movement just described would suffice

to bring into play the "voluntary" motor mechanism, and so supply the active consciousness or experience of active movement. And this, aided by the representative or reproductive power, would, it is evident, contribute important factors to the production of voluntary movement, more particularly the motor idea or representation, which, as we saw, is one ingredient in its psychical initiation. To this must be added *the experience of certain interesting results of movement, viz.*, benefits in the shape of removal or lessening of discomfort, or production or increase of pleasurable feeling: and *the association of these benefits with particular varieties of movement.* We have now to inquire how this more complicated experience, *viz.*, that of pleasure-producing movement, may arise.

It is evident that this experience will be forthcoming when by an accidental coincidence a movement involuntarily carried out in one of the ways described above brings about a favourable change in the child's condition, whether this be to remove or lessen discomfort or to introduce a positive element of pleasure of a sufficient amount to excite the child's attention to the sequence.

Such coincidences would be secured to some extent by the agency of Random Movement, as when a child spontaneously strikes an object and produces the agreeable effect of a noise. It is to be remarked, however, that random movement, since it does not presuppose an antecedent state of discomfort, would have to depend altogether upon the production of positive pleasure. Since, moreover, the movements in this group appear to be few in number and restricted in their character, they cannot constitute a considerable factor in the development of voluntary movement.

Let us now turn to the reflex or sensori-motor variety of primitive movement. So far as this is from the first a specialised motor reaction organically connected with a particular sensory process, it remains what it was originally, at best but a subconscious psychical phenomenon. These movements may indeed be taken up into voluntary ones by a purposive on-bringing of the sensational stimulus, as in the complex movements of grasping, in which the closing of the fingers upon contact is reflex: yet they do not rise to the level of distinctly conscious phenomena.

It might be supposed that the more diffused or scattered type of reflex movement offers a better starting-point for the development of voluntary movement. Thus out of the variety of the movements caused by a sudden sound there may arise a turning of the head in the direction of the sound, which would bring about a new pleasure. At the same time, the very fugitiveness of these reflex movements would prevent their being of much use in this way.

It is to the group of instinctive movements, with which we may take the early undifferentiated expressive movements, that we must look for a true starting-point in the development of voluntary action in the human individual. Here we have among the psychical antecedents of the movement a feeling of pleasure or of pain, and an active element, *viz.*, craving or impulse.

It has been pointed out above, in connexion alike with expressive and with instinctive movement, that all feeling originally tends to excite the "voluntary" muscles to action, the range of this effect varying with the intensity of the feeling. We can easily observe that during a state of pleasurable or of painful feeling the infant carries out a number of movements of the limbs, the vocal apparatus, etc. A word or two will make it clear that it is this type of wide ranging, unspecialised, feeling-prompted movement which supplies the nucleus of a truly volitional action.

Out of the variety of movement thus arising certain elements will modify the pre-existing feeling. Thus, if the child is expressing a feeling of pleasure, the movement may react by prolonging and intensifying the pleasure, as in producing agreeable sound from a toy. If, on the other hand, it is giving vent to a feeling of discomfort or distress, some of the movements called forth may tend to relieve the pain. In this way, for example, it might hit on the movements which relieve cramp in the limb, which banish the feeling of cold by bringing it nearer the mother's body, and so forth. Attention to these changes in their connexion with the particular movements bringing them about—which is secured by the deeply interesting nature of the changes—will serve to fix them in the memory. And thus an opening will be supplied for the

instinctive prompting referred to above, *viz.*, the seeking of the beneficial or pleasurable and the avoidance of the hurtful or painful. Hereafter, through the recalling of the sequence, the child is able to represent beforehand the relief or on-coming of pleasure, and also to consciously initiate the appropriate movement by an idea of the same.

From this brief sketch we can see that, given the instinctive impulse to seek pleasure and avoid pain, and a sufficient amount and variety of the experience of feeling-prompted movement with its reflex effects on the prompting feeling, voluntary movements might arise by a process closely analogous to that of natural selection. That is to say, *particular movements among a miscellaneous group would be consciously selected and preserved because they were found to be beneficial or useful to the agent.*

We have here assumed that the field of selection is as wide as the "voluntary" muscular system, that whatever the nature of the original feeling, it is just as likely to prompt to one kind of movement as another. But, as we have seen, this is not the case. The child is endowed at the first with more or less *specialised* impulses or instinctive promptings which appear to stand in an organic relation to particular groups of movements. Thus hunger, which in its active form is known as the nutritive impulse, begets along with a weaker and more diffused excitation of movement a specially energetic excitation of movements of particular organs, *viz.*, *those fitted to bring about the satisfaction of the impulse.* Still more clearly is this original restriction and specialisation of the motor excitation seen in the case of those instinctive locomotor movements (alternative movements of the legs) which are produced by bringing the soles of a baby's feet in contact with one's lap.

Such special impulses or instincts would serve greatly to expedite the process of selective adjustment; not only so, the instinctive prompting has in it, as we have seen, an element of vague craving, which shows itself when not immediately satisfied in characteristic and energetic muscular effects. Thus the child when hungry is specially predisposed to carry out the movements appropriate to

this craving, and to find a peculiarly intense gratification in satisfying its active impulse. Hence the eagerness with which the movements are carried out, and the energy with which they are maintained during the prompting of the appetite. All this would, it is evident, greatly favour the selection and retention of the appropriate movements. In other words, in proportion as the element of instinctive prompting is powerful, and its direction specialised, the process of volitional acquisition is shortened.

We may now pass from the sub-volitional domain and confine our attention to the process of voluntary action itself. We have to inquire a little more closely into the volitional process, and to explain the nature and development of each of its constituent factors.

The Factors of Voluntary Action. The process involved in a voluntary action may be best seen by means of a simple example. The child has tasted an orange. You offer him another, and he puts out his hand and takes it. The psychical event in this case seems to consist of the following stages. The complex of visual sensations supplied by the orange suggests, according to the law of contiguous association, the representation of the taste and the pleasure accompanying this. This representation of a pleasurable experience closely connected in time with an actual presentation excites the state of desire. That is, the child craves a renewed enjoyment of the orange-sucking. The idea of the succulent pleasure-giving orange, fixed and sustained in the state of desire, suggests in its turn (also by associative reproduction) a particular action or series of movements by means of which the pleasure may be realised. Here we have the representation of certain movements, the last psychical antecedent of the actual execution of the movement. The ensuing physiological process, the innervation of the muscles, lies outside the psychical domain. Lastly, there is the stage of realisation of end or accomplishment, *viz.*, the active consciousness which accompanies the motor or muscular process, and the substitution of the real experience of sucking for the representation of the same. This, however, is not so much a phase of the volitional process

itself as its psychical consequence under normal and favourable conditions.

We may now consider more fully each of the main factors in the volitional process, *viz.*, the highly complex state of desire and anticipation of end; and, secondly, the factor of motor representation regarded as a conative phenomenon.

DESIRE.

The state of desire, though it has its crude prototype in instinctive impulse, only becomes distinct as experience advances, and action takes on a definitely voluntary character.

The Analysis of Desire. (1) Since all definite desire is of some object or perceptible result, one obvious element in the psychical state is an idea or *representation.* When a child desires an object, say an orange, or a playmate's society, he is imagining this object as actually present or realised. In this way all desire is related to the *intellectual* side of mind. Where there is no knowledge there can be no desire. We must have had experiences and be able to recall these with some degree of clearness before we can have a desire for new and similar ones. Our desires multiply as our experience widens and grows more varied.

The representation involved in desire may be either a mere reproduction of a past experience, as when one desires an orange, or may involve in addition a constructive process. We are able to desire things of which as yet we have had no fruition, provided that they resemble actual gratifications closely enough to allow of our forming the necessary images.

The representative element in desire differs from that in intellectual imagination. In desiring a thing, say a fruit which I see, that which is desired is not the thing now existent as I perceive it, but this object *brought into a certain relation to myself.* In other words, the object of desire is always *an unrealised condition of the self*—here the pleasurable experience of eating the fruit.

(2) It follows that all representations do not excite desire.

This is only aroused by such representations as have a concomitant of *feeling*, and more particularly of things which appear fitted to benefit us or to bring us pleasure. In desiring a succulent fruit, a child represents the delight of eating it: in desiring a good social position or a high reputation, a man represents the coveted situation on its pleasurable side.

Now we have seen that the representation of something pleasurable has itself a pleasurable tone. In mentally forecasting the incidents of a coming tour abroad we have an ideal 'sip' of the actual pleasure. But in ordinary cases this ideal element is greatly inferior to the reality, and is recognised as such. And this consciousness of inferiority lies at the very root of the state of desire or craving; for to desire a thing is to experience or feel the absence or *want* of this thing. This is shown by the fact that as soon as this sense of discrepancy between the actual and the imagined state of thing disappears, as in the intenser imaginative realisation of an enjoyment, desire expires.

The relation between feeling and desire here brought out is a particularly close one. Not only does the representation of a pleasure wholly unrealised at the moment arouse this craving, the actual experience of pleasure appears in most cases to beget something like a desire for its prolongation. if not also for its intensification. Since, however, pleasure as such satisfies, while pain as such discontents us, the excitation of desire by feeling is much more apparent in the case of painful experiences. Actual suffering produces a restlessness, an appearance of a craving for, and a striving after, escape or relief from the misery.

While feeling is thus an antecedent and main condition of desire, the latter state contributes in its turn new elements of feeling. As pointed out above, wants or cravings form one great class of our pains. A common if not a constant element in desire is the sense of the inferiority of the ideal to the actual. This is distinctly painful, and when desire is fully developed, that is to say, is not immediately replaced by its satisfaction, the painful ingredient grows more distinct and may become intense. We thus see that desire, viewed as an affective state, is a complex phenomenon, in

which a pleasurable element, the accompaniment of the representation, is opposed to, and in conflict with, a painful element, the sense of deficiency or shortcoming, which last grows more intense, and may 'quench' the pleasurable element if the state of non-realisation is unduly prolonged.

(3) While desire thus stands in relation to each of the two other phases of mind, it is sufficiently marked off as an *active* phenomenon. It is in virtue of this characteristic that it constitutes the connecting link between knowing and feeling on the one side, and willing on the other. In desiring a thing, say an approaching holiday, we are in a state of active tension, as if striving to aid the realisation of that which is only represented at the moment, and recognised as such. This innermost core of desire has been variously described as a movement of the mind (*e.g.*, by Aristotle), and more commonly as a striving towards the fruition or realisation of the object.

This element of active prompting in desire appears under each of the two phases which, as we have seen, are always present in our active states, *viz.*, attention and muscular consciousness.

It is evident, in the first place, that in desiring a thing, as a position, a prize, our attention is closely fixed and concentrated on the idea. In the degree in which the idea is interesting and exciting, so will it tend to persist and monopolise consciousness.

This calling forth of a strong reaction will in itself, conformably to what has been said above, give the colouring of active consciousness to the state of intense desire. But there is more than this. The direction of the attention to an idea tends, as we have seen, to develop and intensify this idea. Now, so far as this becomes a conscious process we have, it is obvious, a new and very important conative ingredient. In fixating the agreeable idea we tend to pass insensibly into a state of *striving towards an end*, *viz.*, an intensification, or fuller degree of realisation of that which is desired, and so recognised as not yet fully realised.

In the second place, as we have already seen in connexion with the phenomena of sub-conscious desire (impulse or organic appetite), desire involves an accompaniment of muscular activity

and the correlated "active consciousness". To desire is to be incipiently active, to be stirred to muscular exertion. Desire and complete muscular inaction are incompatible, and the motor agitation in this case has the look, at least, of incipient, tentative reaching out towards attainment.

Desire and Aversion. The great contrast in the region of feeling between pleasure and pain has its counterpart in the domain of activity. While the representation of what is pleasurable excites the positive form of desire, that is, longing to realise, the representation of what is painful awakens the negative form of aversion, or the longing to be rid of. We strive *towards* what gives us pleasure, and *away from* what gives us pain. If the pain be an actual experience of the moment, aversion takes the form of craving for relief, a form of desire which, as has been hinted above, seems to be the most primitive. If, on the other hand, a pain be merely imagined, the aversion assumes the aspect of a mental recoil or shrinking back.

Here, again, we may connect the active phase of desire with the process of attention. Just as positive desire for what is grateful involves an exertion of the attention, with a more or less distinct purpose to fix, intensify and fully realise the agreeable presentation, so the recoil of aversion appears to involve a *withdrawal* of attention from the ungrateful presentation with a view to displace or expel it. And this rejection of what is painful is seen still more plainly in the shrinking back from an anticipated pain.

Conditions of the Strength of Desire. The state of craving admits of different degrees of strength or energy. Our desires range through all gradations of intensity and persistence, from vague, fugitive wishes, up to intense and absorbing longings. These differences show themselves in various ways. Thus, a strong desire prompts to great and prolonged activity or exertion, whereas a weak one fails to do so. Again, strength of desire may be measured by the amount of pain incurred if the craving remains unsatisfied.

The most important circumstance determining the strength

of desire or active prompting is the magnitude of the pleasure represented. In general it may be said that the greater the pleasure represented the stronger will be the desire, and the more energetic the current of active impulse. Thus a schoolboy's activity (mental and bodily) is roused to a much greater extent by the prospect of a whole holiday than by that of going home half-an-hour earlier than usual.

At the same time, it is to be borne in mind that the representation of the desired object may not accurately correspond with the degree of the actual enjoyment. As philosophers, ancient and modern, have been wont to remind us, that which is near influences us, by way both of attraction and repulsion, more powerfully than that which is remote. The strength of a desire is thus proportionate not to the intensity of the actual experience of pleasure but to its intensity *as represented and estimated at the moment of desire.*

This general principle that we desire things in the ratio of their imagined pleasurableness must be qualified by one or two considerations. In the first place, it is to be remembered that a person is not at all times equally disposed to activity. A more powerful inducement is needed to stir active impulse when we are inactive and indolent than when we are strongly inclined to activity. Such differences in the excitability of desire are probably connected with differences in the degree of vigour, and the consequent instability or readiness to discharge, of the motor centres.

One other modifying circumstance may be touched on, *viz.*, that of volitional inertia or habit. The very fact of having erected an idea into an object of desire, and striven towards its realisation, generates, as we shall see more fully by-and-by, a tendency to go on desiring and striving in this direction.

Desire and Motive. Hitherto we have dealt with desire merely as a state of craving without any reference to the nature of the desire as realisable or non-realisable. There are many desires which do not go beyond this stage. Thus we may have a passing *wish* for this, that, and the other impossible thing, including even nascent longings for past enjoyments. Since

unsatisfied desire is painful, an educated will seeks among other things, to check all futile and unreasonable desires by *reflexion on their unattainability*. In this way there arises a tendency, never perfectly realised, but realised more and more as volitional development proceeds, to shut out all cravings that remain mere cravings.

Where, however, circumstances allow of a gratification of the desire this passes into a new form, *viz.*, an impulse to carry out a particular line of action. A desire when thus transformed into an incentive or excitant to action is what we call a *motive*.

A motive is thus a desire viewed in its relation to a particular represented action, to the carrying out of which it urges or prompts. The desire in this case ceases to be a vague, fluctuating state of longing, and becomes fixed and defined as an impulse to realise a definite concrete experience, *viz.*, *the known and anticipated result of a particular action;* or, since the object of desire is now foregrasped as the certain result of a particular active exertion, it assumes the form of the *end* of this action.

Motor Ideas as Constituents in Volition. We may now pass to the other factor in conation, *viz.*, Motor Representation. We have already, to some extent, examined into the nature of motor ideas. We have now to view them under a new aspect as a factor in the volitional process.

In representing a movement, say that of throwing in a cricket-ball to the wicket, we have, as we have seen, to do with a complex experience, and a complete idea of the movement would, of course, involve all these constituents. Again, the experience of movement includes, not only a sum of muscular and other sensations connected with the action of the moving organ, but also a visual percept. When we move our arm we see the movement and its immediate result as a change in our visual field. In fully representing the act of throwing in the cricket-ball we should include the visual image of the moving arm, and of the ball flying into space

A little reflexion shows, however, that though we can thus represent a movement in this complete way before initiating it,

we rarely, if ever, do so. The forecasting which suffices to bring about our ordinary movements is too rapid and fugitive to allow all its aspects to be realised imaginatively. Moreover, even when the idea of movement becomes more fixed and is definitely attended to, the restrictive and selective action of attention tends to bring about a special imaginative summoning of a particular phase. Thus a cricketer throwing in a ball from the field would attend specially to the amount of exertion (as also the direction of movement) necessitated by the particular position of the wicket, whereas a boy throwing a stone into a pond would have his attention mainly directed to the idea of the coming splash. The most constant factor in the motor representation is a more or less definite foregrasping of the action as conscious exertion or active consciousness. To will to move the arm is thus to enter already, in a measure, upon an active experience.

It was pointed out just now that the state of desire becomes modified by attachment to the idea of a definite movement. We have now to see how this attachment modifies the motor representation.

As soon as experience and association suggest that a desire is realisable by a particular action, the idea of this action becomes itself a matter of interest, and so is fixed by the attention. Not only so, as soon as an action is thought of as a means to a desired object, *the action is itself desired*. That is to say, the object of desire is now envisaged as the final stage of a larger experience in which the action itself occupies a place. Thus when a boy, feeling uncomfortably hot and desiring a bath, thinks of the river hard by, he foreacts more or less distinctly, and desires, the whole experience of going to the bank, undressing, and plunging in. This is a peculiar case of the effect of *transference of feeling*.

Initiation and Actual Performance. When the force of a desire is thus concentrated upon, and made the psychical support of, a particular motor idea, the initiative stage of action is completed. As soon as a desire prompts us with sufficient intensity or strength and a suitable action is suggested with the

requisite distinctness and stability, the actual performance follows, provided that there is nothing to counteract this prompting. No additional psychical initiative in the shape of a *fiat*, or a conscious process of resolve "I will to move," is required in this case.

We may thus say that the conative process which initiates a voluntary movement is resolvable into *the idea of a definite movement backed and sustained by the force of desire.*

The actual movement itself is only of psychological account so far as it is a conscious process, that is, an active experience. We know, however, that the processes involved in the execution of a movement are in part purely physiological. Thus the efferent transmission of the cortical excitation to the muscles lies altogether outside the boundaries of psychical phenomena. Yet, owing to its bearing on the interesting *metaphysical* question, the action of mind on matter, psychologists customarily touch on the relation of the conative process ("willing") to the actual performance; and we may be permitted to follow their example.

From a scientific point of view, the process here referred to must be regarded as a succession of a purely physical upon a psycho-physical process. The action of certain regions of the nerve-centres, correlated with the state of desire and motor representation, is followed by the out-going current of motor innervation. How, it may be asked, is this effected? Here two views offer themselves: (*a*) The theory which connects active consciousness with the efferent nervous current theory asserts that the representation of a movement already engages those motor centres of the cortex from which the process of innervation issues, so that we have merely to suppose a stage of sub-excitation of central motor elements passing into a full excitation which leads to an out-going discharge. (*b*) The hypothesis that the whole conscious experience in muscular action is a product of peripherally-induced sensations maintains that all ideas of movement engage *sensory* nerve-centres; and in this case the motor discharge in voluntary movement will have to be thought of as brought about by special nervous paths connecting these sensory with the required motor centres.

Variations in Type of Voluntary Movement. The general form of the volitional process just described admits of certain variations. Thus, as pointed out, the conative process is in many cases set going by a sensation, so that the whole action takes on the appearance of a complicated *reflex* movement. This applies to the numerous actions of early life which are responsive to sense-perceptions, and may be brought under the two heads of approaching or getting possession of agreeable objects, and receding from or getting rid of disagreeable ones. Later on, the growth of experience leading to more complicated ideational processes brings about what is, in appearance at least, a new form of voluntary movement, *viz.*, an internally or ideationally initiated form. Thus we think of a needed book in another room or in a friend's house, and go in quest of it. Here the process of desiring and acting is not started immediately by any sense-stimulus of the moment. Even in such cases, however, the form of reflex movement is not wholly lost. For the processes of ideational suggestion, even when prolonged, depend, as we have seen, on sense-presentations as their starting-point. Thus the idea of the needed book will have been called up directly or indirectly by the perception of something in our present surroundings, *e.g.*, a reference in another book.

One other variety of voluntary movement demands a moment's attention. Certain actions appear to be brought about by vivid and persistent ideas of movement apart from desire. These *ideo-motor* actions, as they have been called, are illustrated in imitative movements, as when a spectator reproduces some of the balancing movements of a rope-walker. We shall have occasion to refer to these later on. Here it is enough to point out that, properly speaking, these only come into the category of volitional phenomena so far as they are initiated by some analogue of desire.

That there is a rudimentary desire in many so-called ideo-motor movements is certain. Thus the carrying out of a movement vividly suggested by a present situation, as a boy's leap at the mere sight of a gate, a brook, and so forth, is always (in a perfectly normal condition of mind) due to a special pleasur-

able interest in the motor idea, *e.g.*, as new and untried, as difficult and so promising κῦδος, and so forth. Similarly, as will be seen, in the case of imitative movements. Where, on the other hand, a movement follows quite independently of desire, it must of course be regarded as non-voluntary. This applies, for example, to those slight unintentional movements towards the object intently fixated in thought by help of which what is sometimes erroneously called thought-reading, but is more correctly styled muscle-reading, is carried out. Here the involuntary character of the movements is clearly shown in the fact that the person who thus gives the clue is, as he thinks, trying to inhibit all such indications. A like execution of motor impulse in opposition to a true conative or desiderative process is observable in the working out of an *idée fixe*, as when a man leaps from a precipice; for in this case we have, it is evident, to do with the effect of morbid fascination, in which a painful idea of what is harmful, instead of being shrunk from, persists, and masters the attention.

Development of Voluntary Movement: Growth in Precision. The progress of voluntary action will, it is evident, depend partly on the growth of the feelings and desires, partly on the extension of that experience of movement and its results which subserves the acquisition of a stock of motor ideas. The first factor will be best considered in the following chapter in connexion with a full account of motives. In the present chapter we shall trace the progress of voluntary action as determined by the second factor, the extension of motor experience.

The mastery of a particular movement for volitional purposes is a gradual process. A succession of tentatives is necessary before the precise form of movement is consciously differentiated or solated, and retained in the form of an idea. As we saw above, the volitional adoption of movement is a process of selection. The primordial tendency to general diffused movement with any on-coming of feeling has to be restricted or inhibited. A child, when learning to write, to play the piano, and so forth, has to separate out a particular group of manual movements from among a miscellaneous throng of useless ones. Also the particular con-

nexions of movement which are primordial and organically determined and known as "concomitant movements" (*Mitbewegungen*) must be broken through, as when in learning to play the piano a child has to move the fingers separately, repressing the organically associated movements of the other fingers.

By such repeated performances, aided by the laws of retention and reproduction, the learner acquires definite motor ideas, and attaches these to ideas of their results, both those which are constant, depending on organic connexions, *e.g.*, the visual (or auditory) results of movement, and those which are variable, depending on special circumstances, organic or environmental, as the state of hunger, and the proximity of food.

As already implied, the repetition of movement, or what we call practice, tends to facilitate the process of initiation. The psycho-physical association of a particular movement with a particular result becomes fixed, so that less preliminary attention to the idea of movement is required. More particularly such recurring performance serves to repress as no longer needed the distinct idea of the motor experience itself. The bare idea of the wished-for result, *e.g.*, the look of the door opened by one's arm, the sound produced by an act of articulation, suffices now to reinstate the appropriate action.

Complication of Movement: Construction. The acquisition or mastery of particular movements leads on to the attainment of new and more complex forms by the help of these as elements. The process here has already been indicated in the general account of construction. There presents itself a set of circumstances, with a correlative need, similar to previous ones, the motor actions appropriate to which have already been learned. This leads by an assimilative process to tentative movements of a like character. Little by little the old type of action is modified in the required direction.

This acquisition of new movement, by help of previously acquired material, illustrates most obviously the process of combining elements. Such combination may be simultaneous, as in joining movements of the arms and speech-organ in reciting; or

successive, as in the actions of feeding, dressing oneself, and so forth. The vast majority of useful actions are made up of successive movements with more or less of simultaneous combination also. As shown above, these successions are held together in consciousness by the force of contiguous association. At the same time the process of modifying old motor acquisitions includes along with combination a certain amount of separation. It is obvious that each integration of movements into an organic whole, *e.g.*, of the fingers of the two hands in parallel scale exercises, tends to keep these combined in this particular way; so that when we require to re-combine the movements in new arrangements, as in playing a scale in what is known as contrary motion (*e.g.*, upward with the left hand and downward with the right), there is the force of the old associations to work against. A striking example of this is the boy's tendency to move his tongue when he learns to write, a practice probably due to the fact that when beginning to write a word the learner must distinctly represent the associated sound and along with this the corresponding articulate movement (*cf.* above, p. 189).

Imitative Movement. A considerable factor in the early development of voluntary movement is what is known as imitation. By an imitative movement is commonly meant one which is called forth directly by the sight of that movement as performed by another. Thus it is an imitative action when a child pouts, shakes his head, and so on, merely in response to another's like movement.[1]

Imitation implies a connexion between the visual percept of a movement and the idea of the movement itself as a complex of active and passive sensations. Hence it only begins to appear when the correlated centres have attained a certain development. It is often said that imitation is instinctive, that is, unacquired. But since it only begins to appear about the fourth month, when simple *voluntary* action directed towards an end is also first recognisable, it is probable that imitation is acquired.

[1] When sight is not involved hearing takes its place, as in imitating the sound of an invisible insect or other object.

Imitation presupposes a certain experience of movement and a resulting stock of motor ideas. It presupposes, further, special attention to the movement in its connexion with the visual percept when the movement was carried out by the child itself. To wave the hand in response to another's action implies that the child recognises the similarity of the visual impression of this movement to that of previous hand-movements of its own.

As already pointed out, imitative movement is of the ideo-motor type, *viz.*, that in which movement follows upon an idea of the same. In many cases, as in the instance given by Lotze, moving the arm in sympathetic concomitance with the movements of a billiard player, there appears to be no conscious purpose. In some cases, indeed, the imitative movement seems specially useless, as in imitative coughing. Such movements touch if they do not go beyond the boundary-line of voluntary movements. At the same time most imitative movements involve an element of *pleasurable interest.* The child does not by any means imitate *all* the actions it sees, but only certain ones which specially impress it. In some cases it recognises them as significant, and adopts them as expressive signs, or as useful, *e.g.*, in imitating the actions of persons at table. Sometimes, again, the movement is rendered æsthetically interesting, as in the case of odd or funny gestures, as also of new and fine-looking performances. Where these motives are lacking there is often an intellectual incentive at work, *viz.*, the *curiosity to see how a thing is done.* Hence we have good reason to suppose that in most, at least, of a child's imitation there is a rudiment of desire. For the rest, the abundant imitative activity of early life illustrates the strength of the *playful* impulse, of the disposition to indulge in motor activity for the sake of its intrinsic pleasurableness.

Imitative movement, while in certain cases it takes the form of repeating (in response to another's example) an action that has been previously acquired under the pressure of some special desire, may, further, assume the form of an acquisition of *new* combinations. A child learns to talk, for example, by striking out for the first time particular combinations of articulate movement under

the stimulus and guidance of others' speech. Here it is evident the process is more complex. The new imitated action must be recognised as partially similar to the child's own past movements, and so suggest these. The motor ideas thus revived will then be modified and combined very much as in the constructive process of independent acquisition.

Imitation is a characteristic of early years and of crude stages of intelligence. The growth of the higher controlling motives which have to be considered by-and-by serves to inhibit the naive primitive impulse to imitate what others do. At the same time the mimetic impulse is not rendered inoperative: it is only narrowed and specialised by an intensification of the element of conscious purpose. Thus the boy imitates what he thinks to be 'grand,' as a certain carriage or form of speech; what he sees to be useful, *e.g.*, manual dexterities; what his moral and his æsthetic sense tell him to be worthy, as brave deeds, and so forth. The purposive character grows specially distinct in all comic imitation or mimicry, which aims at a *quasi*-artistic effect of ludicrous spectacle.

Movement and Verbal Suggestion: the Word of Command. Very closely related to imitative movement is that form called forth by the presentation of some arbitrarily attached sign of movement, such as the gesture signifying 'Come here!' or a verbal symbol. Here, too, there is an associative connexion between particular sense-presentations (sights or sounds) and corresponding motor ideas; only that in this case the connexion is not organically determined from the outset, but formed by the processes of education. In training a dog or a child to respond to signs, that is, to obey, the object is to induce such a close connexion between the rousing sign and the motor reaction as that the latter shall follow certainly and immediately.

According to the common view, the responsive movements which we call obeying are acquired by a properly volitional process, *viz.*, the desire to avoid punishment, to earn reward, or to please the commander. And there is no doubt that this properly

describes what takes place in all drill-like discipline. At the same time it must be remembered that there is a wider influence co-operating at all stages. This influence is *the tendency of all motor ideas, when sufficiently vivid and stable, to realise themselves in actual movement.* Words are, as already pointed out, potent suggestors. To name a movement, as in the request 'Give me your hand,' is to call up a vivid representation of this movement. Hence the response is swift, easy, and but half-volitional, and in certain cases, as when a child's thoughts are pre-occupied, grows approximately involuntary and automatic. This stage of automatic response is strikingly illustrated in the immediate obedience of the hypnotised subject to absurd and even hurtful commands on the part of the operator.

This power of calling forth sign-provoked movements in others is a chief instrument in education. The disposition in young creatures to move when movement is suggested, aided by the strength of those social feelings which lead to respectful attention to what older people say, serves to give the educator a large direction of early activity. By such educative direction movement is indefinitely modified and expanded, and so the development of voluntary command of the motor organs greatly furthered.

Internal Origination of Movement. In all the forms of movement considered so far action is of the reflex or sensori-motor pattern, occurring in response to certain sense-presentations. A higher stage is reached when movement becomes detached from such external sensuous provocatives, and follows on an internal process of ideation. In this way it becomes internally, or, to speak in physiological language, centrally, initiated. This internal origination is illustrated whenever the idea of a particular movement is suggested by processes of ideation, as when a child goes back on his forgotten promise to do something, and then sets about carrying out the action.

After a certain amount of experience of bodily movement, and the acquisition of something like a complete visuo-tactual map of the moving organs, together with a vocabulary of these and their

various movements, ideas of this, that, andthe ot her movement tend to recur with greater and greater facility. Moreover, the extension of the process of repetition or practice greatly furthers the *readiness* to move as soon as an idea arises. Hence there emerges a new type of movement, *viz.*, one detached from the special impulses and desires which first called it into existence. This is illustrated whenever we move a limb *from the mere wish to do so.*

It is evident that the acquisition of this ability to move instantly, and with the required precision, through the mediacy of the mere wish to move, serves greatly to further the whole process of motor acquisition. By thus gaining a ready command over every variety of ordinary bodily movement, apart from other movements, and also from the promptings of particular sets of circumstances, the learner is put into a much better position for carrying out those processes of re-combination of elements through which further advance is secured.

Voluntary Movement and Consciousness of Power. The succession of stages in the growth of voluntary movement just described brings with it, in an imperfect or obscure form, a new conative element, *viz.*, the consciousness of self as agent and of its power of producing certain effects in the world of presentations. A word or two on this concomitant may suffice at this stage, seeing that a fuller consideration of the subject will have to be made hereafter.

It was pointed out above that the conative process, strictly speaking, ends with the transition from the idea to the actual presentation of the movement. What follows (process of innervation, contraction of muscle, etc.) depends on extra-psychical, *i.e.*, purely physiological, causes. At the same time, these physiological processes contribute new psychical elements, *viz.*, not only the full sensational form of the active consciousness itself (muscular sensations), but also immediately attendant changes in the perceived surroundings, such as that of the visible scene due to the movement of an arm across the field. Now, it is these changes in the presentation-scheme which constitute the most *interesting* factor in

what we call a voluntary movement. It is through attending to these changes, as uniformly following (under normal conditions) particular conative processes, that we come by our idea of *power* or *causal agency*.

There is reason to think that the child begins to note these sequences at an early date, and so to arrive at a dim consciousness of its power. At first, this may be supposed to take the form of a cognition of the dependence of an outward effect, *e.g.*, approach or removal of an object, on the movement of "my" limb. As we saw above, the child's first idea of self is a sensuous image, *viz.*, that of its corporeal frame. The actions of its limbs are, as explained above, localised in, or referred to, these, and thus connected with the bodily self. Indeed, this first crude idea of self is probably quite as much of a moving or active frame as of a sensitive organism subject to pleasure and pain.

As ideation develops the line of cleavage between the self and not-self will be shifted. The agent will now be thought of as the imaging and desiring subject, and the bodily movement will tend, on its visual side at least, to be taken up into the group of resulting changes in the presentation-world. This stage will presumably have been reached as soon as movement assumes the internally originated form just described.

HABIT.

General Nature of Habit. The development of movement here traced out illustrates in a specially clear manner the working of the law or principle of habit, a principle already touched on (see p. 112 f.). A word or two may be added in illustration of its working in the domain of movement.

Habit is a product of acquisition. In this respect it differs from instinct, with which otherwise it has much in common. We say we do a thing from habit, *e.g.*, nod back when a person not recognised nods to us, when as a consequence of long practice and frequent repetition the action has become in a measure organised, and thus shorn of some of its original appanage of full

consciousness or attention. The characteristic note of habit is mechanicality. In its most forcible manifestation habitual movement approaches to a sub-conscious reflex, as in the case just referred to. Hence Hartley spoke of habit-transformed movements as "*secondarily automatic*," to distinguish them from the "primarily automatic" or congenital reflexes.[1] This falling off in consciousness is, as already pointed out, correlated with the circumstance that the nervous structures engaged in the action are becoming perfectly 'organised,' that is, specialised by formation of definite lines of discharge into a perfectly co-ordinated mechanism of parts fitted for this one mode of function.

In a wide sense habit includes *all* the results of repetition and practice. Hence an action begins to come under the law of habit *as soon as it is acquired.* It is evident, indeed, that the volitional process in its complete, fully-conscious form is restricted to new, or at least infrequent actions. It is only when I have to do something new and unfamiliar that I need to realise, with the maximum distinctness, in the way supposed above, the idea of the end and the idea of the required movement.

The on-coming of habit is shown most obviously by the diminution of effort. Repetition of an action renders it *easy*. This growing facility in executing a movement is a complex psychophysical phenomenon, depending partly on processes of organic growth which involve the peripheral organs, as in the strengthening effect of exercising particular groups of muscles, shown in a lessening of the *muscular* strain; partly on the formation of the central connexions already alluded to, which manifests itself in a diminution of the strain of *attention*.

Along with this increased facility goes increased *promptness* and *certainty* of motor response. Here we see the result of more perfect associative organisation. Thus we note the effect of habit in the immediate sequence of a movement on the recurrence of the bare idea of a desired object, *e.g.*, of an addition of sweetness

[1] The student must note the ambiguity of the word 'automatic' as referring now to random, now to reflex movements.

to our cup of tea. Here the intermediate idea of the movement tends to drop out or to be 'skipped'.

A further and more striking result of this fixing of associative connexion is seen in the swift succession of movement on the occurrence of the connected sense-presentation. This is illustrated in the recurring movements of every-day life, as taking out a latch key on approaching one's door. Where this process is complete there lapses not only the initiative idea of the movement, *but even the idea of object to be attained.* Thus when a man automatically winds up his watch on taking it out of his pocket during the operation of dressing for dinner, the action seems to be wanting *in all ideational initiation.* Here then the habitual movement approximates to a pure conscious reflex, movement following at once on a sensational stimulus.

As a last illustration of the effect of associative co-ordination in making movement habitual and automatic we may take the case of a *series of movements* already touched upon (see p. 187). Simple examples of this are to be found in walking, dressing and undressing, in playing from memory a well-known piece of music.

Such frequently repeated chains of movement as those just named approximate in their lack of clear consciousness, their mechanical regularity, and promptness of succession to the motor sequences in breathing, and other "primarily automatic" movements. These characters imply that particular central nervous arrangements have become completed, by which a stimulus supplied by the carrying out of one member of the series of movements instantly evokes the discharge required for the carrying out of the next member. What differentiates such habitual chains from primarily automatic successions is the initial volitional impulse. I must consciously and voluntarily *start* the walking, the dressing, and so forth. But the start is all, so far as volition is concerned. The succession then takes care of itself, and, what is more, *is carried out better for the non-intervention of attention.* We cannot undress, we cannot spell a familiar word, if we think too much about the successive steps of the process.

Habit and Routine. In the above account of habit the influence of the principle has been traced in the production of movement only Yet, as was suggested above when dealing with the feelings and again in treating of the desires, habit has to do also with these important antecedents of voluntary movements. Taken as including the whole effect of repetition in inducing subsequent recurrence, habit shows itself in the tendency of most men to be regular and periodic in their desires and impulses. The man of routine goes through the whole cycle of his daily avocations largely under the lead of habit. Thus certain desires recur at stated times, and in this way take on something of the character of those original bodily appetites which arise through periodically recurring organic feelings. In this way the whole series of daily pursuits, the rising and dressing, breakfasting, going to the place of business, and so forth, tends to get welded into a single chain of actions, with, at most, a partial development of desire for each succeeding pursuit when the proper hour arrives

Degrees of Habitual Co-ordination. It follows from our general definition of the principle, that habit will show itself in very unlike degrees of strength. The process of organic attachment is more or less complete in the case of different movements.

We may estimate the prompting force of habit in more ways than one. The most obvious index is, as already suggested, lapse of psychical initiation as seen in the *swiftness* of the motor response. All the popular examples of habit, as the story of the victimised soldier who dropped his dinner at the word "Attention!" shouted by some practical jokers, illustrate this feature. The swifter the response to a particular sense-stimulus, the greater the force of habit indicated. Another criterion is *speciality* or precision of response. All habitual actions of the more pronounced type are definite varieties of movement specially co-ordinated with equally definite varieties of sensation-complex. Thus the soldier's loss of his dinner was due to the unerring precision of the habitual reaction, the swift dropping of the arms into the vertical line on the recurrence of the customary signal. The stronger the habit, the more definite or exact will be the response. Another measure of strength of habit closely connected with the preceding is uniformity, or *unfailingness* of response whenever the proper stimulus occurs This criterion, together with speciality

or definiteness, gives to habit its unvarying and monotonous character, its resemblance to the actions of a machine, and to those lower nervous reflexes which come nearest to mechanical actions. Lastly, the strength of a habit is directly measurable in terms of the *difficulty of modifying it* by special volitional effort. Half-formed habits can be easily altered: wholly-formed, only by dint of extraordinary volitional effort.

Employing such criteria, we can draw up a scale of habitual movement. At the upper extremity we have the "secondarily automatic" type of movement This extreme variety approaches the primarily automatic in more ways than one. Thus it resembles instinct in its stubborn blindness and refusal to discriminate. Just as an animal under the force of instinct sometimes lays its egg in the wrong place through overlooking difference, so a man will now and again under the force of habit take out his latch key when approaching somebody else's door.

From this extreme variety downwards we have a series of manifestations of habit with less and less of the characteristics just dwelt upon. Thus the kicking away a stone lying on one's path is less habitual than the warding off a blow with one's right arm. The movement is less swift, less specialised, for the stone will be sometimes removed by the other leg or by a switch of our stick, and less uniform, for we only thrust the obstacle aside at all in a certain percentage of cases.

The main conditions on which these varying degrees of habit depend appear to be the following: (1) *The amount of time and attention* given to the particular movement or combination of movements so as to make it our own. Since habit is superinduced on a volitional process, it is evident that the action must first be perfectly acquired through a conscious process of acquisition. (2) *The frequency* with which the particular stimulus has been followed by the particular movement. This condition, repetition, or frequency of performance, is the great determinant of strength of habit. (3) *The unbroken uniformity* of past responses. By this is meant that a particular stimulus S should have always been followed by a particular motor reaction M, not

sometimes followed, at other times not, or followed by another sort of movement, as M′. This condition evidently goes to determine the degree of unfailingness, as also of specialisation in the habit. Thus, children who are sometimes required to do a certain thing by their parents, but now and again allowed to intermit the action, never acquire perfect habits

Habit and Plasticity of Movement. It is evident from our account of habit that it is essentially a process of fixation, a restriction of movement to definite lines Habitual actions, just because they become sub-conscious and largely non-voluntary, are rendered stable and unalterable. Habit thus presents one aspect which is opposed to all that we understand by development or progress. Itself the product of development, it tends in its turn to obstruct to some extent further development. We see this in the difficulty the tyro at the oars encounters in turning his boat, rowing with one arm and backing water with the other; and in the common failure of stout resolve to break through noxious habits.

While, however, in its narrower and more rigid form, habit diminishes the plasticity of the neuro-muscular apparatus, it would be an error to suppose that it is wholly an obstacle to progress. This would be to overlook the range of the principle, its influence in cases where action falls far short of the automatic stage, and also to misunderstand the nature of motor development. What we call new movements are never wholly new, and, as pointed out above, the perfect mastery of particular movements always helps us to the mastery of others Thus the movements of equilibration and locomotion in skating are, as every learner knows, greatly furthered by previously acquired and habitual movements. The learning here consists in a few and comparatively slight modifications of old combinations in particular directions; and though the modifications may be difficult through the obstructive force of the previous co-ordinations, they are a far less difficult operation than would be the learning of the whole group of movements *de novo.*

Habit and Volition. The characteristic of habit here touched on brings out the relation of habit-prompted to voluntary movements. Volition, as a conscious process, is selective, and voluntary action consequently modifiable. Habit, though a product of volitional activity, tends to become subconscious and automatic, and so fixed and unalterable. So far as this is the case, the movement ceases to be our own in the sense that we consciously initiate it, and can inhibit or alter it as circumstances require. How far our ordinary habits are thus cut off from the psycho-physical process of volition it is difficult to say. In early life, at least, while the nerve-centres are as yet plastic, habits may be modified if only a sufficient strength of motive is forthcoming. This is seen in the possibility of learning new combinations of movement, as in dancing, and so forth. Even in later life long and stubborn habits may be broken through by men of exceptionally strong will. Yet there comes a time when the process of organisation resists all further modifying influence.

REFERENCES FOR READING.

On the general nature of volition see Ward, article "Psychology" (*En. Brit.*), pp. 42 f. and 72 ff., and Höffding, *Psychology*, vii. A. On the development of voluntary movement consult Bain, *Mental and Moral Science*, bk. iv. chaps. i. and ii. The phenomena of Habit are illustrated by Carpenter, *Mental Physiology*, bk. i. chap. viii., and by W. James, *Psychology*, chap. x.

CHAPTER XV.

COMPLEX ACTION: CONDUCT.

Simple and Complex Action. In the previous chapter we have traced the process by which each of us acquires the command of his moving organs. It is in consciously bringing these into play that we first carry out conative processes, or, as we popularly express it, exercise our will. Such voluntary movements, moreover, are the necessary pre-condition of all higher and more complex conative processes.

This higher type of complex action is distinguished from that simple type of action which we have hitherto studied, *viz.*, voluntary movement, partly by the greater complexity of the motor factor itself. That is to say, the later and more difficult actions consist of integrated series of mutually adjusted movements or combinations of movements. This is seen by a glance at the complex co-ordinations which make up the occupations of a man's business or profession, as writing a letter, meeting a client, and so forth.

Such complex actions are, it is evident, only possible by help of a good deal of preliminary forecasting of result or what we have called ideational initiation. It is the growth or expansion of this internal ideational factor which most plainly marks off the higher region of action from the lower region of voluntary movement.

Since this ideational factor is, as we have seen, at once an intellectual phenomenon (presentation), and an affective phenomenon (feeling), it follows that the growth of volition will depend on that of intellect and of the feelings.

(1) The growth of *the intellectual factor* in volition is seen first

of all in the multiplication of desires with growing experience. The child's first cravings are prompted by actual sensations, *e.g.*, hunger, or by percepts, *e.g.*, the sight of something agreeable. As the inner ideational life unfolds, ideas of pleasure-bringing objects are added through processes of suggestion. Thus, as experience teaches the uses and enjoyments of common objects about him, desires will be awakened by a larger and larger number of percepts. Not only so, the growth of ideation will enable him to imaginatively move forward to a greater and greater distance from the actual present, desiring things in the remote future as well as at the particular moment.

Not only does the growth of ideation thus amplify the range of conative impulse by multiplying occasions of desire, but it serves to introduce greater complexity into action Thus as the range of representation enlarges the child will forecast more complex groupings of action, together with their consequences, remote as well as proximate. A further and important consequence of this growing range and complexity of conative representation will be the inclusion in the mental forecast of the *undesirable* along with the desirable results of a projected action, and the production of that peculiar condition of mind known as opposition of impulses.

(2) The effect of the development *of the life of feeling* on conation is equally marked. In studying the early growth of will we assumed that only the simpler feelings came into play. The command of the bodily organs is gained to a considerable extent under the stimulus of the sense-feelings The first desires and aversions which rouse the muscular organs are connected with the pleasures and pains of the bodily life and the senses. With these impulses there co-operate from an early period others derived from the primitive or instinctive emotions, such as the love of activity and of displaying one's power, rivalry, and the early crude form of curiosity, or the desire to inspect objects. The effect of the first awakening of social feeling is seen in the impulse of imitation, and still more clearly in that of obedience to commands, both of which, as we have found, contribute, in an important measure, to the early development of movement.

As the feelings grow in number and the higher forms of emotion begin to appear, the conative process will be prompted by a larger variety of desires. Thus the child begins to act for the sake of earning praise, of giving pleasure to others, or of doing what is right for its own sake. In this way each new advance in emotional development tends to widen the range of desire in a corresponding measure.

Motive-Ideas. As the result of a concurrent development of ideation and feeling there now appears a new form of conative stimulus. The simplest form of a conscious pursuit of end involves, as we saw, merely the representation of a single pleasurable experience realisable by a particular action. Conation does not, however, remain at this level, but comes more and more under the stimulating effect of a *general* aim, as thrift, health. Such aims are, when psychologically considered, motive-ideas.

The nature of these motive-ideas may be seen by examining any common incentive to action, as ambition or thrift. The impulse to put things aside for the future grows out of complex experiences and reflexion on these, such as the evil of not having the things when required, the difficulty in getting them the moment they are wanted, and so forth.

Such motive-ideas are further marked off by a clearer consciousness of need and of an incomplete self. Thus in thrifty action a man is feeling his dependence on certain external conditions, the misery of a state of improvidence, and the comfort of the opposite state. Here, then, desire takes the form of an impulse to realise a new condition of the self.

In the case of other motive-ideas, as ambition, there is a still further complication of the motive-structure. The boy's desire to get on, to rise to the top of his class, or be the captain of the cricket eleven, involves a peculiarly distinct form of self-consciousness, *viz.*, of the self as permanent, and as expanding. This again implies a way of viewing life as a whole or in its continuity.

Unification of Action: Permanent Ends. This last feature of the higher conation, the viewing experience as a con-

tinuous whole, constitutes the most important of its distinctive characters. Early crude action is *piecemeal action*, that is, the isolated pursuit of this, that, and the other temporary gratification. The development of reflexion and self-consciousness leads to an organisation or unification of action into a connected system. Thus ambition when fixed as a steady incentive means a *recurring* motive-idea, leading to a succession of progressive actions, the whole constituting the pursuit of a *permanent end.*

Such permanent ends arise as the product of a growing con- sciousness of the persistent self, its abiding relations to the environment, and the interests correlated with these. In this way we all of us learn to think of our health as a stable possession to be maintained day after day by a repetition of certain habitual actions. In like manner we come to erect knowledge, reputation, æsthetic culture and enjoyment into enduring interests and recur- rent motive-ideas which lead to consistent *courses* of action.

Such unification of successive actions into a course of action involves, just like the integration of a series of movements into a methodical action, a reference not merely to the temporary, but to the permanent results of each member of the train. Thus a boy who is learning to aim at knowledge as a permanent interest will be prompted to pursue this and that piece of know- ledge, not only for the sake of the particular pleasure which every intellectual acquisition brings at the moment, but for the sake of its subsequent value as an element in the permanent structure of his knowledge.

In the measure in which each individual action is thus viewed in its bearing on some portion of our lasting welfare, our doings become unified or consolidated into what we call Conduct Impulse, as an isolated prompting for this or that particular enjoyment, is transformed into a comprehensive aim and a rational motive. The agent now compares his particular actions so as to make them harmonise one with another and converge towards one permanent mode of self-realisation. Such conscious unification of particular actions manifestly involves a clearer idea of a consistent self, and has indeed as its secondary motive the

intellectual gratification which comes from a sense of harmony or consistency.

Desiring Means as Ends. As was pointed out above, the desire for an object begets a desire for the conditions of its fruition, more particularly for the appropriate action. Now, in order to carry out any line of action, it seems necessary that we should fix attention on the immediate result of the act, as that which guides and controls the process. Hence the tendency, according to the principle of associative transference of feeling, to erect this proximate result into a kind of secondary "end" of the action. Thus, if a person feels cold and goes to shut the door, realisation of the idea of the closed door becomes the immediate object of his action. That is to say, for the moment he loses sight of the initial stimulus, feeling of cold and the idea of the desired warmth, and is occupied in shutting the door. In the case of pursuing a permanent end, as riches or health, this preoccupation of the mind with the means of attaining our object becomes still more marked. Money represents many alternative possibilities of avoiding ill and realising good. A man cannot, it is obvious, represent even a small part of these at any one moment. Hence a specially noticeable sinking back into indistinct consciousness of the primary end in this case, and the engagement of the attention by the secondary or derivative end.

How far the genesis of motive-ideas is thus referrible to the action of the principle of associative transference is a point of dispute. It is probable that the love of money involves, in addition to this effect, the co-operation of a blind instinct, a modification possibly of that secretive impulse which, according to some psychologists, is a common human instinct; and the presence of such an instinctive factor seems to be still clearer in the case of the permanent ends of knowledge, friendship, and so forth.

Non-Personal Ends: Desire and Pleasure. In the above account of motive-ideas it has been assumed that what the idea stands for or represents is some object of desire or end, that is, according to the view adopted here, a *personal* satisfaction or gratification of some kind. An idea only

becomes a *motive*-idea when it thus comes into such a relation to our active impulses as to constitute the representation of a future (actual or possible) enjoyment for ourselves

At the same time it must be evident that in the pursuit of these ends we do not always distinctly represent the end under the form of a pleasurable satisfaction for oneself. Thus, in the pursuit of science a man often loses sight of self, and is said to be 'disinterested'. In other cases the exclusion of all personal regard in action seems to be still more manifest. Thus in the pursuit of posthumous fame a man appears to be working for a result which he knows he will not be able to enjoy. Finally, reference may be made to those forms of devotion *to others*, which are specially marked off as disinterested action or self-abnegation. A mother who knowingly wears herself out to preserve a delicate child, and the soldier who willingly meets death in defence of his country, cannot, it is said, be supposed to be representing a future *personal* satisfaction. This case is, it is evident, marked off by the presence of the self-oblivescent attitude of sympathy.

What is the exact relation of these "disinterested" forms of pursuit to the seeking of personal gratification is a matter of keen dispute among psychologists and moralists. On the one side it is said that all voluntary action is effort to realise a pleasurable idea (including the getting rid of painful ideas); on the other it is maintained that we may, and frequently do, desire objects altogether apart from their pleasure-bringing aspect. It is probable that we have here to do with a phenomenon of peculiar complexity. It has been allowed above that there are vague forms of impulse or striving which are anterior to experience of pleasure. This *instinctive* factor probably enters into our highest non-personal pursuits, *e.g.*, knowledge and reputation. At the same time it seems undeniable that when active impulse takes on the form of distinct desire for a particular object, the realisation of this object or end necessarily assumes a pleasurable aspect. In desiring knowledge I must think of the attainment of knowledge as a mode of gratification, as a change in my condition which will increase my happiness. Similarly in desiring another's happiness I necessarily tend to conceive of the realisation as pleasurable to me, as witnessing, or at least knowing of, the same. It does not follow from this, however, that in pursuing these ends my attention invariably fixes itself exclusively or even mainly on this pleasurable or 'felicific' aspect. Just as in the æsthetic contemplation of a beautiful object a man attends immediately to certain *presentative* elements and their relations of harmony, etc., and consequently gets the pleasure *indirectly*, so in pursuing an end, such as the completion of an enterprise, or the good of one's country, his attention is fixed on the securing of certain objective changes, while the bearing of these on his own happiness may for the moment drop out of consciousness. The special fixation of the attention in this case on the securing of certain presentations is explained by the very

nature of voluntary action, in which, as we have seen, the thoughts direct themselves *to the immediate result of the action.* Habit tends to confirm this, so that a man may go on seeking certain object-changes, *e.g.*, increase of wealth, with no reference to personal gratification, and even when if he were to reflect he would see that no positive pleasure is procurable. In this case, however, the other side of desire, *viz.*, aversion, becomes prominent, for the intermission of habit causes pain, and habit-prompted actions—so far as they are consciously volitional—may be said to be sustained by aversion to this pain [1]

Complex Action. Action, as we have seen, gains in representativeness as we take remote consequences into account. And this increase of representativeness implies an increase in the complexity of the action. In a special sense we may call an action complex when it is not the result of a single impulse but involves a plurality of impulses which modify one another.

This expansion of the representative stage of action assumes one of two contrasting forms. In the first place, the desires or impulses simultaneously called up may be harmonious and co-operative, converging towards one and the same action. In the second place, the desires may be discordant and opposed, or diverging into different lines of action.

(*a*) **Co-operation of Impulses.** The combination of two or more elements of desire or impulse in one conative process is exceedingly common, and may be said, indeed, to be the general rule. Many actions which seem at first sight to have but one impelling motive will be found on closer inspection to have a number. So simple an action as going out for a walk may be motived by a number of concurrent impulses, as desire for locomotion, fresh air, and change of scene.

The most interesting example of this co-operation of desires is seen in the case when, in addition to the primary impulse related to the pleasure following the action, there presents itself a

[1] The view that all ends are resolvable into modifications of pleasurable feeling is represented by Dr. Bain, though this writer allows that voluntary action is apt to be modified by the effect of persistent ideas (*idées fixes*), *Mental and Moral Science*, bk. iv. chap. iv. The opposite view is maintained by Prof H. Sidgwick, *The Methods of Ethics*, chap. iv.

secondary impulse related to the activity itself. In a large number of our actions the initial impulse to realise some end is reinforced by another, to follow out an agreeable line of action. In all sportive or play-like action, from that of the boy up to that of the tourist in his mountain "playground," this secondary impulse attains a special degree of prominence.

(*b*) **Opposition of Impulses.** The second variety of complex action, in which two (or more) impulses come into antagonism, is of yet greater importance. Owing to the opposition in this case the representative or reflective stage of the action becomes much more prolonged and complicated than is the case where a number of impulses are co-operant. In addition to its special psychological importance this type of action has a peculiar interest from an ethical point of view; for moral conduct, or obedience to the moral law, is the outcome of this mode of complexity.

Arrest of Action: Inhibition. This variety of complex action is characterised by the clearer emergence of an element in the conative process which we have so far neglected, *viz.*, the arrest or inhibition of action. This element is of course present from the beginning. As we saw in the preceding chapter, particular movements are learnt by preserving them selectively from among a crowd of concurrent movements, which last have accordingly to be repressed. It is, however, only in the higher region of action which we are now considering that this factor of inhibition assumes a prominent place. It is when we are simultaneously prompted by a plurality of impulses leading in distinct directions, that is, to different lines of external action, that the process of inhibition becomes manifest and impressive. The opposition of motor forces in this case produces an arrest of action which may be temporary only, leading to a delay or postponement of the action, or may end in its complete suppression. This inhibitory effect of one desire or impulse on another is closely analogous to the reciprocal inhibitory effect of competing presentations or representations.

As already suggested, inhibition is a physiological process as well as a psychological, and seems, indeed, to be a general con-

comitant of psycho-physical action (*cf.* p. 21 f.). That concentration of the mental field which conditions clear consciousness is presumably correlated with a corresponding narrowing of the area of cortical activity. In like manner it is supposable that a special and intense excitation of a certain region of the motor centres, as in steadily representing a particular action, will be inhibitory to the simultaneous innervation of other motor structures. Along with this direct central effect there probably goes an indirect peripheral effect, *viz.*, the opposing action of the "antagonist" muscles. Common experience tells us that when we try our utmost to check an impulse to carry out a movement, *e.g.*, the group of movements constituting laughter, we bring antagonistic muscles into energetic play.

Action Arrested by Doubt. The simplest case of arrested or inhibitive action is that in which the belief necessary to the carrying out of an impulse is checked. In the early stages of action we are prone to be confident in our powers. We can easily observe in children's first experiments in movement that they are carried out boldly, that is, with a full assurance of success. To these hopeful tyros in the domain of human action failure comes as a shock. The child looks perplexed, confounded, when he first encounters an object too heavy to be moved. These failures suggest uncertainty, and this sense of uncertainty or doubt will serve to arrest or temporarily paralyse the child's action. Thus, after having had experience of his inability to lift heavy bodies, he will probably have his impulse checked the next time he desires to lift a heavy-looking object.

The production of this form of arrest will, it is evident, depend on the teachings of experience. A child that notes its failures as they take place and afterwards recalls them will more frequently experience this inhibition of impulse than one that is unobservant and unretentive.

The occurrence of this inhibition of active impulse by doubt will further depend on certain organic conditions. In cases where the vital energies are high, and the motor system is vigorous and predisposed to activity, the active impulse will be strong and

not easily checked. Not only so, belief is itself conditioned in part by the same organic factor. Where there is a powerful disposition to act, there confidence tends to be high, whereas when the vital energies are low, and, as a consequence, the active impulse is weak, distrust is apt to creep in.

Recoil of Desire: Deterrents from Action. A second and in general more effective form of arrest occurs when desire prompts to a certain action which is represented as itself disagreeable, or as leading on to some painful consequent. In this case the impulse to realise a pleasure is opposed by an aversion to what is disagreeable. And so far as this shrinking from a painful experience frustrates the positive impulse, we are said to be deterred from the action.

The first case is illustrated in the general inhibition of desire by a disinclination to action whether through indolence or through fatigue An indolent person holds back from performing actions suggested to him, and even desired for a moment for the sake of their results, under the deterrent force of the idea of the exertion or strain. A state of fatigue illustrates a more decided form of the antagonism of impulse. Here desire may be strong and urgent, only that it is opposed by the deterring influence of weary muscles or brain. The last dreary stages of a piece of heavy work, pedestrian, literary, and so forth, illustrates this type of experience.

The second case in which arrest of action and conflict are introduced through an opposition in the results of the action is a no less familiar experience. We are often at once prompted to an action by the idea of a pleasurable result, and deterred from it by the idea of a painful result. Here the collision, the antagonism, is decided and sharp. Two strong impulses, the craving for what is agreeable, the shrinking from what is disagreeable, assert themselves, the first prompting us to do a thing, the second not to do it, with the effect that we are 'pulled up,' and for a moment at least undecided.

The effect of the prevision of evil in repressing impulse will in this case also vary according to a number of circumstances, such

as the relative strength of the attractive and deterrent forces, and the height of the active current or disposition to be active at the time. Here, too, we may note marked differences of effect according as the temperament is wary or cautious, and highly susceptible to the deterrent effects of anticipated evil; or, on the other hand, heedless of unpleasant consequences, and impatient of delay—a contrast well illustrated in the case of Macbeth and his wife when planning their ambitious crime.

Rivalry of Impulses. As a third type of arrest, we may take the case where there arises a plurality of positive impulses. When a man is at one and the same moment stimulated to different lines of action by two disconnected desires, conflict arises through the prompting of incompatible impulses. A student, we will say, is fond of music, and feels strongly impelled to attend a particular concert. But he has to prepare work for to-morrow's class, and he is interested in the subject, and desires to do his best. Here each desire to realise a pleasurable object is opposed and inhibited by a desire for another pleasurable object. Hence we can describe the state as a *rivalry of desires* or impulses.

This rivalry of impulses may assume different forms. Thus two actual feelings may prompt in different directions, as when, tired and hot after a walk, we are at once impelled to rest, and to procure a draught of water; or the desires for two particular objects may come into conflict, as in the illustration given above. Other examples are supplied in the rivalry of one of the higher motives with a lower impulse, as in the common experience of the competition of the sensual or appetitive and the more intellectual pleasures, and in the rivalry of motive-ideas one with another, as when the pursuit of study comes into competition with that of society or of athletics.

Passive Resolution of Conflict. When we are thus at the same time strongly drawn towards and repelled from an action, or drawn towards two [illegible] lines of action, the antagonism of forces brings about a temporary state of inaction, each impulse alternatively moving us in this and in that direction. This is a condition of acute conflict and profound misery, a

state exhibited in its most intense and impressive form in the moral paralysis of Hamlet.

Happily such a process of alternate advance and recoil is rarely a very prolonged experience. It tends to resolve itself without the interference of any new volitional factor. Thus, in many cases, one of the contending impulses proves, after its full development, to be stronger and more persistent than the other, and so acquires the mastery as determining motive. Many temporary conflicts are in this way resolved by the emergence of a mastering impulse. This applies more particularly to cases where a higher motive comes into play against one of the lower impulses, for, as a complex ideational product, the former requires a certain time for its full development.

Again, even in cases where the rival impulses are pretty equally balanced, the strife is apt to resolve itself through the co-operation of another factor, *viz.*, *the pain of the state of conflict itself.* Where this is keen and intolerable it expedites the process by giving an adventitious or borrowed superiority to the particular impulse which happens to be uppermost at the moment.

Regulated Conflict: Deliberation. The supposition of a passive contention and cessation of contention just described may be said to represent, roughly at least, many of the earlier and cruder forms of what we have called complex action, as those observable in the more intelligent animals, and in children. What we mean by the development of the will, however, implies a transformation of this passive type of process into one having more of the active character, that is, more of the element of active consciousness. This added element takes on the specific form of an *effort of will.*

This form of conative process is seen in its simplest manifestation in the conscious endeavour to resist a particular impulse of the moment, *or the effort not to do a thing.* Here we have, it is evident, a secondary inhibitory volitional process superinduced on the primary impulsive process. This new factor involves a special and difficult exertion of voluntary attention. In trying to check an impulse to do a hasty and foolish thing I set myself to think of

the disagreeable consequence, and, under the influence of this deterring prevision, to banish the idea of the action from my mind. This process again is accompanied by the carrying out of vigorous muscular actions, as in clenching the teeth, the hands, holding in the breath, and the like, which aid in the inhibition of the movement. Such a special exertion, marked off as *effort*, is wanting in the pleasurableness of moderate activity, and is apt to be fatiguing and disagreeable. Hence it presupposes a strong motive force behind.

This motive, like other motives, is the product of experience. It differs from many of these merely in the high degree of its representativeness. To will not to act when impulse urges us on is motived by a shrinking from the evils of rash or impulsive action. This motive is a slow growth presupposing not merely considerable experience, but careful attention to the less obvious and less immediate results of action, and even processes of comparison and abstraction.

Action being thus consciously and intentionally checked, there supervenes a controlled form of the opposition and co-operation of impulse. This is known as Deliberation. Here the attention is voluntarily directed to the several representations (motive-ideas) so as to ensure a due persistence and full distinctness of each, and a proper carrying out of what we know as a comparison of their values as ends. Thus, if it be simply a question of doing or not doing a particular thing, we seek to carefully count up the advantages and disadvantages, and to set the one against the other; or, if it be a case of two rival ends, we endeavour to measure the value of one object of desire with that of the other.

In addition to this deliberation respecting the relative magnitude or value of our *ends*, there is a deliberation respecting the relative advantages of this and that mode of securing our end, or what we call *means*. Here a new intellectual factor comes in, *viz.*, a comparative estimate of practical agencies, that is to say, an exercise of what we call practical knowledge and judgment. This kind of practical reflexion obviously involves the recalling of past

experiences, the comparison of these, and the carrying out of certain processes of reasoning.

The process of active deliberation here briefly described is a higher form of that work of integration or unification in which, as we saw above, the whole development of consciousness consists. To reflect upon our competing impulses and aims is to make them our own, that is, to take them up as elements in a new mode of self-consciousness. Since, moreover, all deliberation aims at giving a proper hearing, so to speak, to the several impulses or motives which demand to be satisfied, it directly leads to a fuller investigation of, and reflexion upon, the complex organisation which we call the self.

Choice or Decision. Where the process of deliberation has been carried out under normal conditions, *viz.*, in a healthy mind, and in strict subordination to practical ends, it leads on to what is popularly known as an act of choice or decision. Thus, after duly weighing the pleasure and the pain, the good and the evil, which will result from a particular action, such as going in for an examination, the one may be seen to preponderate over the other, so that we choose or decide to carry it out or not to do so. In such cases we are said to consciously choose or decide upon the particular course of action with its attendant result.

Here, it is evident, we reach a higher degree of organisation of the conative process. The selection of a particular action as the result of deliberation makes this action *my own* in a new and fuller sense. Choosing to do a thing, by the very slowness and deliberateness of the process, gives rise to the clearest form of active self-consciousness, investing the conative process with the form "*I* will". Such a process of elective decision, with the concomitant consciousness of full self-assertion and self-manifestation, reduces the chaos of competing impulse to order and unity.

Here, again, the essential psychical factor seems to be an act of *volitional attention*. Just as deliberation is a designed maintenance in consciousness of certain motive-ideas so as to secure a due comparison of magnitudes, so the final decision is the intentional maintenance of a particular idea so as to secure its realisa-

tion in action. Thus, when deciding to serve a friend or to set about a difficult piece of work in spite of more attractive suggestions, we are specially directing attention to, and so realising, the idea of the greater or more important end.

It is not, however, to be supposed that the process of deliberative or rational decision ordinarily takes the lengthy and orderly form here described. For one thing, there is in no case such a perfect active control of the process throughout as has been here assumed. The organic conditions spoken of above, *viz.*, the impulse to do something, and the impatience of the painful state of conflict, always contribute to the result. That is to say, where any decision is arrived at it is, in every case, determined in part "passively" or mechanically, by the forces making for action, and apart from any conscious decision or fiat of the form "I will".

Not only so, a prolonged process of reflexion and decision such as we have imagined is precluded in many cases by the urgency of circumstances. Our every-day decisions have to be carried out swiftly to meet the demands of the moment. A man of decision is one who by practice and training has learnt how to shorten the process, to take in the whole situation by a rapid and intense effort of mental concentration, and, what is equally important, has the practised judgment needed for disregarding a multitude of relatively unimportant points, and so simplifying the problem of choice.

The process of choice or decision takes on a specially rapid and compressed form in all cases where a comparison of ends as more or less important, and of means as more or less suitable, are alike excluded, and the problem is reduced to a discrimination of a particular presentation, and a selective carrying out of a corresponding or appropriate action. This simple type of elective decision is illustrated in many of our every day actions, as in the swift decisions by help of which one "dodges" the cabs in crossing a London street. It has been found by experiment that when there has been a certain mental rehearsing of the several possible situations beforehand, the brain gets specially 'focused' so

that the required action may be singled out and put into execution so rapidly that there is no conscious process of choice at all.

It follows from the above account of the higher conative processes that they are a product of two factors, *viz*, active impulse and reflexion, or what moralists call "practical reason". Volition, *quâ* volition, is of course always activity, and the highest no less than the lowest type of conation is a manifestation of active impulse. Thus the checking of an impulse, so far from being *in*-activity, is a particularly strenuous and difficult form of activity. The man who when confronted with an action to which he is inclined says, 'I will *not* do this thing,' is in an intensely active state, as may be seen by comparing the situation of an indolent person, who can only say, "I have no *will to do it*". At the same time all the later regulative activity is only possible through the higher development of intellectual processes. Thus, as pointed out above, the initial motive to such deliberation is the product of a memory of, and reflexion upon, the results of hasty or impulsive action. A youth who cannot think never feels the desire to pause and deliberate. The carrying out of the deliberative process, moreover, evidently presupposes a developed intelligence and a trained power of steady attention. In other words, a normally developed will is necessarily an "*enlightened will*".

Resolution : Firmness of Will. In many cases our decision instantly passes into action, as when, for example, a gambler decides to stake a particular sum, and instantly places this amount. Here, it is evident, there is no time for a full and distinct emergence of the psychical state, 'I resolve to do this action'. In other cases the carrying out of the action decided upon may through the nature of the circumstances be postponed, as when we decide in the morning to pay a visit in the afternoon. Here the attitude of determination becomes definite and persistent. Such a state is best marked off by the name Resolution.

Resolution represents the most complete process of volition. There is not only the presence and unopposed preponderance of a particular desire, not only a distinct representation of, and desire to perform, an appropriate action, but also the main-

tenance of this idea in consciousness for an appreciable time Such prolongation of the instinctive stage of action, moreover, allows opportunity for the fullest development of the active form of self-consciousness, the state of mind indicated by 'I will'. Hence the state of resolution is popularly regarded as an essential factor in all utterances of "Will" Resolution, though, as we have seen, not distinctly present in all actions (rapid sequences of performance on decision), is a common factor in the more reflective and deliberate form of volition Thus it enters into all actions which involve a prolonged activity, that is, a series of movements. In carrying out a mechanical process as carpentering, in looking up a friend, or in preparing for an examination, we must, it is plain, maintain from the outset a state of determination or resolution with respect to the later stages of the performance. The frequency of uncompleted action illustrates this point; for the abandoning of things when only partly done means that the attitude of resolution was not strong enough.

In all persistent resolution we have a new display of "will-power". Strength of will is commonly judged of by steadiness and pertinacity of resolve, and more particularly what is popularly known by *firmness*. This is illustrated in the maintenance of the resolute attitude under heavy and prolonged discouragements. Such pertinacity in the face of difficulty, as in the crossing of the African forest by Stanley and his party, has a noble aesthetic aspect. Hence the frequency of its illustration in fiction, as in the quiet, heroic perseverance of Jeannie Deans in her journey south. A like firmness shows itself where resolution is maintained in the face of seductive allurement.

Such resoluteness or firmness constitutes a particular volitional quality. It is not by any means the same thing as the ability to choose and decide from among a number of alternative courses. There are men of a light, versatile habit of mind who are equally adept in framing decisions, and in abandoning these on the appearance of the first obstacle or temptation, just as there are others of a "dour" temperament who are slow and awkward in deciding, but having once decided, are preternaturally firm It is

needless to dwell on the moral importance of the quality It is only as men are known to be resolute that they are to be counted on.

While, however, firmness is the very backbone of what we call will, it is apt to take on an exaggerated and hurtful form. This is known as *self-will* in its undesirable form, *viz.*, love of opposing others *on its own account*. As pointed out above, a developed will is rationalised in the sense that the conative process is illumined by calm reflexion. Accordingly, self-will or obstinacy, when it amounts to a refusal of others' counsels and suggestions, to a determination under no circumstance to reconsider a resolve once taken, becomes irrational. Such rigidity of resolution is manifestly fatal to growth. The wise man combines firmness in ruling principles with a certain modifiability in particular decisions.

Process of Self-Control. Through the development of these higher processes of deliberation, intelligent choice and resolution, we acquire what is popularly described as the power of self-control. This expression brings out the fact that the later and maturer stage of volition implies a systematic and intelligent regulation of the earlier and more instinctive impulses through the stable formation of motive ideas and motive-principles. The operation of these regulative motives is accompanied with a peculiar *dual* form of self-consciousness, *viz.* (as the expression *self*-control suggests), the opposition of a lower and more passionate to a higher, more thoughtful, and more judicial self. It is only as the higher motives grow so predominant as to habitually repress the force of the lower impulses that this divided self-consciousness gives place to a new and a larger consciousness of a united self.

The attainment of this condition in which ideational motive preponderates over sensuous or instinctive impulse presupposes a process of physiological development. As pointed out above, the rise and expansion of the ideational life is conditioned by the growth of higher nerve-centres. The motive-ideas, which, as *general* aims or principles, guide the actions of reflective men, are presumably correlated with those nerve centres which are concerned in the formation and the maintenance of general ideas

(see p. 243). This inference is supported by such facts as that when overtaken by fatigue and loss of vigour, as through over-exertion or ill-health, the power of self-control is sensibly impaired, that it is manifestly interfered with by an excessive use of stimulants and other practices injurious to the nervous system, and that its decline is one of the earliest symptoms of the on-coming of *senile* decay and of mental disease.

The processes of self-control have a positive or stimulative, and a negative or inhibitory aspect. The first is illustrated when we do a *difficult* action; for example, leap out of bed on a cold winter's morning under the prompting of a representation of work to be done. The development of the higher ideational motives means an extension of our incentives to action, and the introduction upon the volitional scene of promptings which are strong and effectual in cases where natural inclination is weak and ineffectual. In this case we may suppose that more complex nerve-processes supply the initial innervational impulse which the simple nerve-processes fail to supply. The second or inhibitory aspect is illustrated whenever we restrain an impulse to act, or decide *not* to do a thing, as in declining a tempting invitation on the ground that its acceptance would throw us behind with work. Here we may suppose that the higher cortical centres exert an inhibitory influence on certain lower centres which are partially excited in connexion with the prompting of the impulse to act.

The volitional processes known as self-control assume a somewhat different form in three cases. In the first place, the effect of the psycho-physical process in the operation of the motive-idea may be to excite or to repress action, as in the examples given above. This we will call the control of action. In the second place, its effect may be to modify the phenomena of feeling, and more particularly emotion or passion, as when we repress anger. This is commonly spoken of as the control of the feelings. Lastly, its effect may be to modify the course of intellectual phenomena, percepts and ideas, as when a student under the stimulus of a love of knowledge deliberately concentrates his attention on a particular subject to the disregard of other and

attractive matters. This is known as the control of the thoughts. Although, as we shall see, these forms of the process of conative regulation are not radically distinct, it will be convenient to deal with them separately.

(*a*) **Control of Action.** After the above account of the process of self-control in general little need be added as to the particular form of it marked off as control of action. Remembering that the process is at once an excitation and a repression of action, we may proceed to indicate briefly the successive stages of its growth.

The simplest manifestation of the process here considered occurs when the effect of an actual feeling is counteracted by the mere anticipation of another simple experience of pleasure or pain, as when a child overcomes his indolence and sets about preparing his lesson in order to earn some promised treat, or when he stops his noisy play in obedience to a command, and from a fear of being punished.

A higher stage of control is reached when intelligence is developed and motive-ideas representing the enduring ends, or interests, such as health, reputation, and knowledge, come into play. Here, as has been sufficiently explained above, action comes under the control of more complex and intellectual conative products, particular actions are brought into a relation of consistency and unity one with another, and so take on a more reflective or rational character.

This process of unification is carried a step higher, and action consciously brought into a relation to a single consistent self in what has been called prudence and, better, (practical) wisdom, *viz.*, the intelligent pursuit of the highest personal good. By this is meant that the several aims and interests of life are thought of together, compared as to their relative magnitude or importance, and adjusted in such a way as to yield the greatest sum of happiness to the individual. This implies the subordination of each of the enduring interests, as health, knowledge, to a still higher, more comprehensive, and more abstract principle of action, in which the consciousness of self as an organic unity grows more distinct and prominent.

As a crowning stage in this development of self-control we may take the superinducement on the motive-idea answering to the individual's personal or private good of the yet larger motive-idea representing the common or general good. This form of self-control is distinguished by its peculiar *moral* importance. The chief aim of ethics, according to the modern view, is to determine the proper adjustment of the claims of the individual and of the community; and normal development of volition involves the strengthening of the other-regarding as against the self-regarding motives. This is effected to some extent by the growth of the motives answering to 'common' interests, as knowledge and art, since these lift the individual above the thought of merely personal good; but it involves in addition the strengthening of motives which are distinctively moral, *viz.*, of duty, benevolence, and generally what we call humanity.

The operations of self-control here described when carried out with full explicit consciousness assume the form of acts of obedience to a self-imposed command. Thus a man restraining appetite, or speaking the truth in face of serious risks, may be said to be applying to himself the rule or maxim 'Be temperate,' 'Be truthful'. In this way, as moral development advances, we pass from mere obedience to an external authority to obedience to the inward voice of reason and conscience.

(*b*) **Control of Feelings.** We saw above that all feeling is organically connected with muscular action or movement. In this way it is brought into a certain kinship with action, especially with the earlier and cruder forms of this last. Accordingly the regulation of the feelings is allied to that of the actions. Control of passion appears to take its rise in the inhibition of the motor factor in emotional display, as the movements of the limbs, the actions of the voice in an outburst of passionate grief. The effect of this inhibition is clearly illustrated in the endurance of pain, *e.g.*, under a surgical operation, which is effected primarily and mainly through an energetic repression of movement by means of an innervation of particular groups of antagonist muscles, *e.g.*, of the jaws, of the hands in clenching the arms of a chair, and so

forth. Owing to the organic continuity of the whole emotional process, it is found that *the arrest of external movements tends, to some extent, to allay the whole excitement.* We control a feeling of laughter in unsuitable circumstances by carrying out energetic inhibitory actions of the respiratory and other organs.

What the exact effect of this inhibition of external movements will be in any given case depends on a number of varying conditions, as the strength of the feeling, the history of its rise, and the particular emotive temperament of its subject. If an emotion, say of animosity, is intense, and if, further, it has been gathering in force for some time, the suppression of its external signs may do but little to reduce the intensity of the feeling itself. The man or woman may, while outwardly calm, go on nursing the passion internally by brooding on ideas of satisfaction. Temperament will affect the result through the difference between the volatile or readily changing, and the tenacious or stubborn character of the feelings. In the former case, which is in general exemplified by the young, a slight amount of motor inhibition may suffice to stem the affective current, whereas, in the latter case, the effect of a considerable restraint of movement may be but small.

So far we have touched only on the *inhibition* of the feelings. But here, as in the case of the control of action, there are at once a process of restraint and one of excitation. Paradoxical as it may sound, the volitional regulation of feeling includes an intentional rousing of emotive states. The simplest form of this volitional excitation of feeling is seen in all histrionic imitation. Here, it is evident, we have the counterpart of the inhibitory motor factor in the restraint of passion. The mimic takes on the outward motor manifestations of the feelings he represents, such as the facial movements, gestures, bodily pose, and modifications of vocal action. Such assumption of motor concomitants, by introducing a part of the bodily resonance of the feeling, tends in a measure to develop this last.

The control of the passions, while thus analogous to that of movement, is a distinct process having its peculiar difficulties. Thus, owing to the state of excitement or commotion in emotion,

there is a special difficulty in mastering the expressive manifestation of feeling. This is seen plainly enough in the "tyranny of the passions" in the child and the savage. Not only so, emotion depends not only on an organic, but also on an ideational (representative) factor, and its complete control includes, as we shall see presently, the difficult art of controlling the thoughts.

(*c*) **Control of the Thoughts.** As has been illustrated above, the work of intellection is essentially one that is *actively* instituted and maintained. The processes of volitional attention constitute a main factor in what we understand by thinking. This applies alike to the selective concentration of the attention upon particular sense-presentations in observation, to recollection or the active recalling of past experiences, to the constructive rearrangement of imaginative material in what is specially marked off as imagination or invention, and to the varied and complex forms of elaborative activity which enter into the processes of thought. After the consideration already given to this point we need only add a few words on the distinctly conative or volitional aspect of the process.

The regulation of the ideational processes, as in seeking to recall an idea, illustrates the two characteristics of conative phenomena, *viz.*, active consciousness, and initiation by representation of end.

That volitional attention is an active state has already been sufficiently illustrated and explained. An effort of thought, as in trying to localise a quotation, or to find the explanation of a difficult and crabbed fact, has much in common with an effort to carry out a difficult bodily action. There is a factor of muscular tension in each case, and this seems to some extent to consist of the same constituents, *e.g.*, strong compression of the jaws, and the inhibitory process known as holding one's breath (see above, p. 83).

In the second place, it may be easily seen that these processes of volitional attention are directed by a conscious representation of an end. Thus when an interesting idea "strikes" us, and we proceed to fix our attention on it and to trace out its suggestions,

there is, it is manifest, an endeavour to realise the pleasure of a fully developed ideational process. The pleasure in this case may lie partly in the contents of the ideas and their relations one to another, partly in the activity of attention itself.

The same thing is seen in those more difficult exercises of 'volitional' attention which involve some degree of the painfulness of effort, *i.e.*, excessive exertion. These exertions are forthcoming when a sufficient strength of motive, aided by the requisite organic vigour, is present. Here, then, as in executing a difficult movement, we are seeking to satisfy some craving, to attain a particular pleasurable condition. Thus in casting about for the solution of an intellectual problem we are helping to reinstate an idea or idea-complex, which by filling a gap and rendering an ideational whole consistent and intelligible, will give us intellectual gratification.

Connexion between Control of Thought, Feeling and Action. While we have thus distinguished between three forms of control, we may easily see that they always involve one another to a greater or to a less extent. This follows, in the first place, from the mutual opposition of the three psychical functions. Since feeling, thought and action are in their intenser and more fully developed form mutually exclusive, it is evident that the positive furtherance of any one by a process of conation will involve the inhibition of the others. A word or two will suffice, after what has already been said, to make this clear.

To begin with the effects of feeling, since emotional excitement agitates and disturbs the whole psycho-physical system, disarranging the mechanism of attention, and substituting a capricious feeling-determined succession for a logical order in the flow of the thoughts, it follows that the perfect command of the intellectual processes presupposes the control of the feelings. In order to think we must first be calm and self-possessed. Inasmuch, further, as emotion takes possession of the muscular system, it is plain that the inhibition of feeling is a necessary pre-condition of a full command of the motor organs, and consequently of action. We cannot act so long as we are excited by merriment, paralysed

by fear, and so forth. In like manner, so far as external (muscular) action and internal thought are opposed states of mind, the perfect command of the intellectual processes will include the inhibition of movement.

We may now look at the relation between the control of the thoughts, of the feelings, and of the actions, as determined, not by the opposition, but by the connexion between these mental states. And here we have to do with two cases, namely, the dependence of feeling on intellection, and of action on intellection and feeling.

(1) We have seen that all emotion is excited in connexion with certain intellectual phenomena, presentations and representations. We are glad and sorry, laugh and sigh, because of the occurrence of certain corresponding ideas, as when we anticipate a success, or imagine a painful situation. Hence the importance of a command of the intellectual processes as a condition of a regulation of the feelings. Since, moreover, emotive ideas are specially persistent, being sustained by the force of feeling (see p. 341), this control of the ideational factor in 'emotion' is a matter of peculiar difficulty. A like remark applies to the voluntary fostering of an emotion by mentally fixating certain ideas, *e.g.*, moral, religious, for the fixation necessary to the bringing on of feeling is commonly a prolonged and difficult process.

(2) It has been sufficiently shown that both feeling and ideation are involved in action. To desire, to consciously exert oneself in the pursuit of an end, is to be under the influence of an affectively coloured idea, *e.g.*, that of a delightful intercourse with a friend, of a holiday tour, of a rise in reputation. It follows that a full regulation of action includes that of the feelings and of the thoughts so far as provocative of these. Here, again, we may see the connexion illustrated alike in the excitation and in the inhibition of the phenomenon. We only rouse ourselves to arduous and worthy deeds by steadily fixating the connected ideas. It was by the growing imaginative realisation of the coveted power that Macbeth's faint heart was excited to the pitch of effective volition. In like manner, it is only through the volitional repression of those

ideational and affective processes out of which conation takes its rise that the perfect inhibition of action is attained. A vindictive impulse cannot be said to be completely mastered until the feeling of anger out of which it springs is stifled, and consequently until the idea of the injury which excites the feeling is banished from the mind. Hence the importance assigned in the best ethical systems to the control of the desires and thoughts 'of the heart'.

Volitional Control of Belief. The close organic continuity of the several processes described as self-control is illustrated in the volitional regulation of our beliefs. These, as pointed out, although primarily intellectual phenomena, are profoundly influenced by the affective factor of mind, and to some extent by the active also. Popular language suggests that believing is to some extent a matter of volition. Thus, to mention but a single writer, Shakespeare makes his characters bid one another believe and not believe, speaks of making oneself and others believe, and so forth; that is to say, applies to *believing* the same forms of expression that we all apply to *acting*; and the reason of this is now plain. Belief is apt to accompany all ideational groupings which reach a sufficient measure of vividness and stability. Now one chief condition of this effect is feeling or interest. Such a process clearly involves a rudimentary form of conation. That is to say, we attend to particular ideational complexes *because of* their greater interest, or *with a view to* the pleasure which they yield us. This co-operation of a rudimentary conative impulse is especially apparent in cases where we half-knowingly indulge for the nonce in an illusory belief, as in 'day-dreaming,' in fiction-reading, etc.

From this there is but a step to a more distinct volitional process, *viz.*, *the conscious endeavour to believe a thing*. The influence of the emotions, as personal affection, and the religious sentiment, upon belief, is apt to assume this form. Here we represent a particular state of conviction as desirable, and volitionally aid its realisation by appropriate acts of attention, purposeful or half-purposeful detention of the ideas favourable to the belief and rejection of those unfavourable. Religious systems

recognise the duty of a volitional development and maintenance of faith by a suitable direction of the thoughts

In those processes which we call the *logical* control of belief, that is to say, its adjustment to the requirements of an objective standard, the modifying action of volition is still discernible. Here the process includes the prompting of a highly representative motive, *viz.*, the love of truth, and is directed, on the one hand, to the subjugation of the forces of passion and of impatience which favour hasty and erroneous belief, and, on the other hand, to the securing of that large impartial reflexion on all the relevant circumstances which is the only guarantee for the emergence of a just and true conclusion. In this case, too, then, there is still a desire and a will to believe, only that it is a will to believe *what is true*, that is to say, a volitional process initiated and sustained by a *logical* feeling or a regard for truth as such.

Limits of Control: Measurement of Volitional Force. Each of the forms of volitional control just illustrated has its limits. Thus there is a state of lethargy or depression of active energy, out of which even the most powerful motive may fail to rouse the subject. At the other extreme there is a strength of instinctive or "organic" impulse which no ideational motive can overcome. The story of the horrors of shipwrecked mariners, and so forth, illustrates the fact that no moral or other consideration will hold back a man from slaking thirst when the appetite reaches a certain intensity, and the means of appeasing it are brought within tantalising distance of his lips. In like manner the control of feeling has its limitations. There are hurricane blasts of passion, as when Lear first takes in the fact of his daughters' perfidy, against which the will is, for the moment, powerless; and, on the other hand, there is a depth of emotional languor or insensibility which defeats every *effort to feel*. Lastly, in the region of thought and belief the same fact of a limitation of volitional effort meets us. There are certain organised forms of experience variously called "inseparable associations," "necessary beliefs," and so forth, which set bounds to our powers of thinking. Thus the scientifically trained mind rejects the idea of an event

which contradicts an ultimate "law of nature" as impossible and absurd. There is a certain amount of convictive evidence that the strongest desire to believe in a friend's honour will not surmount.

These limitations are not the same in the case of all individuals. The limit to control of appetite in the case of the drunkard and of the temperate man is obviously a widely different one. What we call strength or force of will is, indeed, measured by the "height" or maximum degree of intensity of the force counteracted. Thus we say a man has a strong will when he can rouse himself to face a cruelty of destiny that would reduce many to a state of impotent cowardice, as in the Hebrew and Greek stories of those who, in obedience to a divine behest; have sacrificed their own offspring on the altar.

Judged of in this way, strength of will is proportionate to the amount of resistance overcome. Now the counteraction of an opposing force is precisely that which necessitates an "effort of will," that is, a moral as distinguished from a physical or muscular effort. We make an effort when we do that which is difficult and "unnatural," in the sense of not doing the thing we are first impelled to do; and this, whether in acting, notwithstanding the inertia of sluggishness or the certain prospect of suffering, or, on the other hand, in declining to act, when to do so were to realise a considerable gratification. We may say, then, that *strength of will is proportionate to the intensity of the effort producible.*

Habit and Conduct: Deliberation as Habitual. While will is thus measured by amount of effort, it is equally certain that what we call a strong will is not in general hampered by sense of effort. Effort is psycho-physical friction, and action when perfect becomes free from this accompaniment. This brings us to consider the effect of repetition and habit on the higher conative processes.

The influence of habit is seen in the deliberative process itself. Although deliberation is a slowing and complication of action, a substitution of a reflective for an impulsive and *quasi*-mechanical process, it comes in its turn under the modifying influence

of practice or habit. Thus in the early stages of volitional development, when action is first arrested by an apprehension of evil consequences, there ensues conflict and confusion of aim. But successive efforts to master the conflict, and to decide according to reason, serve to render subsequent acts of reflexion and decision easier. The vehement forces of impulse have now been reined in to some extent. Every new exercise of the power makes the pause, the consideration, the final calm decision a less arduous process, removes something of the initial biological 'friction,' and gives to the process more of the ease, the fixity, the naturalness of *habit*. "Custom hath made it in him a property." Such a habit of deliberation brings with it deliverance from what the ancients spoke of as the "tyranny" of appetite, or of the passions.

Moral Habitudes. But the principle of habit produces other effects in this region of conduct. The final decision after deliberation, if a rational and good one, does not need to be arrived at again and again in all similar cases. A particular exercise of self-control, say the quelling of a feeling of annoyance, or the determining to do some unpleasant duty, which, in the first instance, was the outcome of a process of reflexion, will, in succeeding cases, be shortened or compressed into control without such preliminary reflexion.

Here we may see that the process of self-control is becoming habitual in a new sense. Certain motives are acquiring a fixed place in the mind as ruling forces, organically connected with appropriate actions, while other and lower forces are losing ground. Every repetition of the situation calling out this particular variety of action (that is, of action having this particular motive or reason) tends to fix conduct in this direction, that is, to establish a habit of doing. The prevailing motive, for example, punctuality in fulfilling engagements, now passes into the form of a fixed inclination or active disposition. Or, to express the result another way, we may say that conduct is brought more fully under the sway of a general rule or maxim. This result is what is known as a moral habitude. Where the process of organisation is

complete, the vanquished impulse survives in a nascent form only, so that its full force is never experienced.

The word habitude is here used to mark it off from 'habit' in the narrow sense of *mechanical response*. In following out a general maxim we never act mechanically as when we repeat a particular kind of action. The contrast is well shown in the case of economy. There is a general practice of economy which has an element of the intelligent and rational in it. On the other hand, it has often been noted that most people tend to be specially given to saving in particular directions, as clothes, and even such trifles as string and pins. Here the unthinking mechanical characteristic of habit stares us in the face.[1]

Volition and Character. The word character (from the Greek χαρακτήρ, mark or stamp) is used in every-day language to mark off almost any sort of difference in mental qualities. In a narrower and stricter sense the term involves a special reference to qualities belonging to the *active* side of the mind. Volition, in its rationalised form, conduct, being the final and most important outcome of mind as a whole, the word character has naturally come to connote in a peculiar manner those qualities, as active energy and deliberation, which go to constitute the higher type of will.

According to the more popular use of the term, every individual has his own stamp or character. This individual character is, as we shall see more fully presently, fixed partly by the peculiarities of the person's psycho-physical 'nature,' or what we call temperament and idiosyncrasy, and partly by the action of the forces of the environment which develop selectively certain of these peculiarities.

In addition to this every-day meaning the word character has acquired an ethical significance. As employed by the moralist, it refers not to variable individual peculiarities, but to certain moral qualities which it is supposed to be the special business of social discipline and education to cultivate in all alike. In this ethical

[1] Mrs. Gaskell has some remarks at once accurate and amusing on these quaint narrowings of the impulse of economy. (*Cranford*, chap. v.)

sense 'character' has come to stand for 'good character'. This may be defined as a morally disciplined will, including a virtuous condition of the whole mind, that is, the disposition to think and feel (as well as to act) in ways conducive to the ends of morality.

We thus see that every good or moral man possesses a character in a double sense. In the first place, he has a particular group of intellectual, affective and conative peculiarities which constitute his individual character. In the second place, he possesses certain virtuous principles and dispositions which make up the typical moral character and which assimilate him to other moral men. This moral character, though it presupposes the organic base of a typical human development, may be spoken of as an acquired product, the result of the action of that set of external influences which constitutes the educative action of a civilised and moral community upon a normal human mind.

(*a*) **Character as Organised Habit.** Confining ourselves now to moral character, we see at once that this consists in the possession of certain acquired tendencies or habitudes which we call virtues, both what moralists distinguish as private ones, for example, temperance and prudence, and as public ones, such as veracity, justice, and benevolence. The excellence of the character can be estimated by the fixity and the preponderance of these virtuous dispositions. The less the disturbing force of the instinctive factor (passion, appetite), the more highly developed the character. Thus our idea of a perfectly temperate man (ὁ σώφρων) is of one who does not fully come under the force of the impulse of appetite. The height of moral character attained in any case is thus determined by the fixity and the commanding influence of the virtuous disposition, which again is measurable in terms of the facility, or absence of conscious effort, of the controlling process.

(*b*) **Character as Conscious Reflexion.** While, however, moral character is thus woven out of fixed habitual dispositions (Aristotle's ἕξεις) it would be an error to conceive of it as merely a cluster or group of such habitudes. According to the biological or teleological view of mind, the habitual, that is, the relatively

un-conscious and mechanical, comes in only so far as features and situations of the environment recur in perfectly like form, and so require similar modes of reaction (*cf.* p. 115). Now while it is true that the external conditions of human life, physical and social, are so far recurrent that our actions may be organised into a certain number of persistent norms or types of conduct, as thrift, temperance, fulfilment of promise and the like, they are not so uniform in their actual, concrete combinations as to allow of our particular actions becoming in the complete sense habitual. It may often require a good deal of reflexion before we can say what is the honest or the just course of action. Not only so, the selection of the wise and the morally good action must always remain a reflective process in those cases in which the complexity in the conditions of our life involves the appearance of a collision between what we see to be equally good and valid principles. The finding out of the right thing to do means, in all such cases, the difficult task of adjusting the claims of this and that principle; for example, health and academic distinction, public service and promotion of family interests.

It follows that the ideal of a wise and a good man, or a perfect character, is one that combines promptitude and even a certain impatience of reflexion in cases allowing of, and calling for, rapid and partially automatic responses, with a reserve of wariness, with a readiness to pause and reflect as soon as new features, and especially an unfamiliar complexity, present themselves. In other words, the perfect character is the one that exhibits just that proportion of the reflective to the impulsive in its actions as is required for the fullest, exactest, and most economical adjustment of conduct to the circumstances of the environment.

Relation of Higher to Lower Volition. In the above account of the higher and more complex processes of volition it has been assumed that it is continuous with, and developed by known psycho-physical processes out of, the lower and cruder forms. We have not found any abrupt break in the process of development. At the same time, there are certain obvious differences between the earlier impulsive and the later reflective

volition. Thus it lies on the surface that this last is differentiated by certain features of special dignity and moral value, *viz.*, a distinct consciousness of self as agent, of power, and of freedom.

These later characters have been supposed by some to constitute a difference not merely of degree but of kind between impulse and volition of the complex form, *i.e.*, conscious choice and resolution. According to this view there intervenes in the higher stage of action a new principle lying outside the chain of psycho-physical events altogether, though breaking in upon and modifying this from time to time. This principle is known by such expressions as Free-will, the self-determining *ego*, and so forth. We have now to review the higher processes in the light of this theory. Here two phenomena of peculiar complexity will specially engage our attention, *viz.*, (*a*) effort of will, and (*b*) the consciousness of freedom or free-will.

Volitional Effort: Consciousness of Power. The characteristics of the sense of effort have been touched upon above. In a wide sense "effort" is used as synonymous with active consciousness, and so is coextensive with the whole field of conation. In a narrower sense it is confined to those severer and more or less painful exertions which are required in circumstances of special difficulty. Effort is thus intensification of active consciousness above the moderate pleasurable limit.

The experience of effort occurs in different forms. (1) The most familiar one is that of special muscular strain. This arises when an action to which desire impels us is excessive relatively to the power of the organ at the moment, and so irksome and fatiguing. The disagreeable feeling of strain in lifting a heavy weight, in walking when fatigued, and so forth, are examples of muscular effort. In all such severe muscular exertion there is a considerable range of motor innervation.

(2) Along with muscular effort there goes the related phenomenon *mental* effort, that is, effort of attention. Here, too, the essential circumstance is energising, under the stimulus of an urgent desire, to an extent which is excessive in relation

to the power of the moment, and so involves the disagreeable accompaniment, a feeling of strain. It follows from the analysis of mental activity and volitional attention given above that this is closely related to, and has a factor in common with, muscular effort.

In the case both of muscular and of mental effort the irksome and disagreeable feature in the action tends as a mode of pain to arrest the impulse. When, however, the impelling motive is strong enough the action will be sustained in spite of the disagreeable concomitant. Not only so, in many cases where the motive is an exciting one, as when a boy is performing a muscular feat in order to win admiration, or a pupil is trying to answer his master's question before the other members of the class, there is no distinct representation of the pain before acting, and consequently no shrinking from it. In such a case there may be the consciousness or feeling of effort during the action, but there is not an effort of will or "moral effort" in the full sense of this expression.

(3) This last form, moral effort, occurs when the painful feature or circumstance *is distinctly anticipated and resolutely confronted by the mind*. Thus the tired labourer who goes on facing his dreary task carries out an 'effort of will' in the complete sense. Here the feeling of effort is an ingredient in the *initiation*, and may indeed be described as an effort of decision and of resolution. It is most strikingly illustrated in the higher kinds of moral effort, as when a boy persists in befriending an unpopular boy in spite of ridicule. Such effort to make good the deficiencies of prompting impulse may be called *assistant* or supplementary.

As we have seen above, however, an effort of will is required not only when a difficult or 'non-natural' thing has to be done, but when an alluring and eminently natural thing has *not* to be done. Thus, in turning away from an enticing prospect, say that of a day's excursion in the country, in deference to a behest of duty, we carry out a variety of effort which may be marked off as *resistant* or inhibitory.

Effort of will, then, in all its forms, whether to do or not to do, *appears to be specially connected with an initial deficiency of motive force*. In making an effort we seem to throw in our strength on the weaker side, either encouraging and aiding a weak 'I will,' or reinforcing a feeble, half-hearted 'I will not'. Thus the effort involved in jumping out of bed on a frosty morning seems to have as its object to neutralise the momentary preponderance of certain agreeable sensations. Similarly in mastering some explosive impulse, as to resent a piece of insolence

The explanation of this apparent exception to the general principle of willing, that action is the result of the desires (and aversions) excited at the moment, has been hinted at above. This effort of will, appearing in cases of insufficiency of stimulus at the moment, is due to a *secondary* conative process, *viz.*, a *preliminary volitional attention to the representations concerned.* This secondary process is best described as an act of reflexion. It implies a special direction and concentration of attention, either on an idea fitted to rouse the reluctant action (*e.g.*, the value of a prize), or on one fitted to excite aversion to, and so abstention from, the impatient action (*e.g.*, the evils of self-indulgence). In either case it has as its effect the rendering of particular constituents of the ideational group called up at the moment more distinct, prominent, and persistent, and, as a result of this, of securing the maximum development of their conative force as motives.

As implied also in what has been said above, this act of attention, like all other actions, is prompted by its proper motive, which may be called *the motive of reflexion*, and which is a product of thought about our experiences. It has more of the characteristics of aversion than of positive desire, since it is a recoiling from the evils or pains incident to hasty action on the one side, and neglect or hasty abandonment of it on the other.

Finally, it may be said, with some degree of confidence, that the phenomena of volitional effort lend themselves to a psycho-

physical description. The intervention of effort as an altering, reversing factor, analogous to the addition of a weight which turns the scale, probably means in physiological language the co-operation of certain highest or latest developed nerve-structures, the action or discharge of which makes good the biological deficiency, or effectually inhibits the biologically excessive action of certain lower nervous planes. That the special intervention of these in the case should have as its concomitant a sense of effort, of obstruction to be overcome, is just what we should expect from our general conception of the relation of consciousness to the hierarchy of the nerve-centres.

It remains to add a word on the consciousness of power which is specially developed in connexion with this experience of volitional effort. As we saw above, the consciousness of self as an agent capable of producing certain effects or changes in the environment begins to arise, from the first, in connexion with the experiences of voluntary movement. As the process of volition expands by the enlargement of the ideational initiative stage, this consciousness is enriched by a fuller representation of the self, its feelings, and active tendencies. It is, however, only when the work of development is carried far enough to allow of the experience of consciously reinforcing a weak, or mastering a strong impulse, that the consciousness of power grows distinct. It is in the process of controlling the promptings of desire by special directions of attention that we realise most vividly our power over our actions. Here a new form of the Ego, the critical scrutinising 'me,' seems to appear behind the old impulsive 'me'.

Consciousness of Freedom: Free-Will. The culminating phase of volitional development is action accompanied by the consciousness of freedom. Since this is among the most subtle and complex of psychical phenomena, and has given rise to prolonged and heated discussion, we must take special pains in the definition and analysis of it.

The idea of freedom as an aspect of the volitional process appears to be borrowed or derivative. Freedom, in its primary meaning, and as popularly understood, is the opposite of external

force or compulsion. We are free so far as we are not physically constrained to do things. In this sense it is obvious that all voluntary acts are 'free' The child becomes free in the measure in which it grows independent of external restraint and is allowed to act for itself.

We reach a secondary and narrower idea of freedom when we contrast our calm and deliberate actions with those carried out under a stimulus of unusual and all mastering strength, as in the case of actions issuing from explosive passion, *e.g*, anger or jealousy, or those carried out by an all-possessing instinctive impulse, as recoiling from imminent danger of life. In these latter instances there is an analogy to the overpowering effect of physical compulsion A man yielding his purse to a highwayman who presents a loaded pistol is, if not physically, at least morally 'coerced'.

In contradistinction to this *quasi* coercive impulsive action, deliberation presupposes a certain calmness and an opportunity for a full, impartial representation of our several desires As a wide competing play of desire, issuing in cool 'rational' choice, the process of deliberate conation gives rise to a particularly distinct sense of freedom, or of self-determination Action initiated by reflective choice may indeed be said to exhibit the characteristics of "conscious" action, delay, complexity of initiative process, selective action of attention, modifiability by introduction of new psychical factors, in their highest intensity and distinctness. As such they naturally appear, in contrast to the simpler, more mechanical and extraneously conditioned types of action, to be self conditioned.

This realisation of the ego as freely intervening and determining the result grows specially distinct in all cases where moral effort enters in. To diminish the effect of a hasty impulse by a strenuous effort of attention to ideas of which it took no account, is in a specially emphatic manner to strike at the tyrannous monopoly of impulse, to modify action by the addition of a conscious process, to assert oneself as supreme. Hence it begets a particularly clear apprehension, not only of self as agent

or cause, but of self as selecting or as *freely* determining the issue.

Psychology and Philosophy of Free-Will. In the above account of free-will we have been concerned merely with the psychological problem, *viz.*, the constituents which go to compose the psychosis which we commonly describe as our feeling or consciousness of freedom. Closely connected with this scientific problem there is an extra-scientific and philosophical one, which has to do with will as a spiritual principle or substantial entity, and with freedom as an attribute of this.

The metaphysical supposition of freedom first took shape in connexion with theological discussion. According to the Necessitarian view of the Divine control of human affairs, man is predestined to act as he acts, and consequently to sin. The doctrine of freedom was a protest against this depressing doctrine. It maintained the existence in man of a self-determining power by the assertion of which he may choose to act otherwise than the circumstances and motives determine. In its modern and purely philosophical form the dispute has resolved itself into one concerning the existence and efficient action of any such occult principle. The Determinist says that all our actions are the product of conditions, which may be roughly subsumed under the two factors, circumstances and character. The upholder of Freedom maintains that in all the higher manifestations of will, deliberation and choice, we have intervening a new spiritual force or principle. He adds that the sense of freedom enters in a peculiarly striking manner into the feeling of responsibility which accompanies moral action, and which makes us blame one another and blame ourselves for wrong-doing.

Since the philosophical question thus appeals to the facts of experience or consciousness it comes into contact with psychology. Indeed, the modern Determinists, as J. S. Mill, H. Spencer, and Bain, argue against the supposition of metaphysical freedom by a thorough-going psychological analysis of the psychical processes involved.

It has been allowed above that the consciousness of freedom

exists. Thus in all reflective choice we do undoubtedly look on the result as in a peculiar sense the outcome of our own minds. This, however, does not necessarily lend support to the metaphysical hypothesis of a self-determining will behind, and occasionally interfering so as to modify the phenomenal process or chain of events. On the contrary, our analysis has proceeded on the supposition that there are certain peculiarities in these more intricate conative processes which account for the development of the sense of freedom. These peculiarities are the delay of action, the expansion of the area of motive, and the superinducement of a secondary conative process, *viz.*, the regulation of the primary process by acts of selective attention. Since we have assumed that throughout these processes motives are at work, this psychological view does not, it is evident, offer any evidence in favour of the metaphysical idea of Freedom. All that we can ever do in deliberation is to develop the motive forces latent in the several desires; and this calling forth of latent forces is itself an action having its own appropriate motives behind it.

A similar line of remark applies to the moral phenomenon, sense of responsibility. An analysis of this mental state suggests that we have here to do merely with a modification of the situation of deliberation. In saying 'I must act rightly, for I am a responsible being,' I am simply expressing the strength at the moment of a particular motive to deliberation, *viz.*, the fear of doing wrong or aversion to the penalties of wrong doing—whether external ones, or the internal sufferings of conscience. For the rest, when on looking back in a penitent mood on a past wrong action, a man says: "I know I could have acted differently," this may be taken to mean either (1) that he clearly recognises the fact that had he felt as he now feels with the new moral motive supervening, he would have acted otherwise; or (2) that he is unawares projecting this new feeling into the past self, and so falling into the illusion of comparing the self as it is constituted at one moment with the self as it is constituted at another and later moment after new experience and reflexion have been added. Here, again, the psychical state may be ac-

counted for without having recourse to the idea of transcendental freedom.

The doctrine that action may be undetermined or unmotived by desire and aversion (as above defined), though having its strongest apparent support in the higher volitional processes of self-control, is rendered plausible to some extent by the difficulties of recognising all the factors even in cases where 'effort of will' does not co-operate. Sometimes the real motive may escape detection from its very faintness, *e.g.*, in many capricious actions of an easy kind motived by the mere love of displaying individuality, of baffling prediction, and so forth. In other cases the forces at work are largely organic and sub-conscious, as the 'blind' stirrings of appetite, and the effects of organised habit. The sum of these tendencies, making up what we call the fixed character, represent the result of a process of organisation extending beyond the limits of the individual life into that of his ancestors. To this it may be added that in all our actions there is a variable temporary factor, *viz.*, the peculiar psycho-physical mood of the moment, including a greater or less readiness to act somehow, a factor which causes the same 'motive' or prospect to have very dissimilar values and results at different times. This, too, serves to give an appearance of arbitrariness to voluntary action even when we observe it subjectively, that is, in ourselves. And when we consider it objectively in others, this semblance of indeterminateness is, of course, greatly increased through our ignorance of the motive-processes themselves. Nevertheless, a deeper understanding of the processes involved leads to the conclusion that in every case action is determined by the group of forces (psychical and physical) operating at the time. It may be added that a scientific psychology, which sets out with the assumption that psychical events can be explained or accounted for by certain conditions, cannot consistently make room for the idea of freedom, so far as this implies indeterminateness of action.

Education of the Will. Our analysis of the process of volition has disclosed the fact that what we call will is a product illustrating the general laws of all mental acquisition. The power to will, like the power to think, grows by exercise. The practical problem of training the will and forming the moral character must be based on this truth. To develop the ability to decide, to act, is essentially to exercise the mind in the carrying out of these processes. We learn to do by actual experiments in doing.

Now, every exercise of will, being itself a volition, must, it is

obvious, have its adequate motive. When we are dealing with the development of another's will, as in the education of the young, we have to secure the required motive force by the well-known educational agencies, as fear of punishment, desire for commendation, affection or desire to please Here, indeed, the problem of developing will resolves itself into the question how to call forth useful character-forming actions, involving a certain amount of self-restraint and moral 'effort' under the stimulus of motives supplied by the child's relation to its social environment.

When, on the other hand, as in the later stages of 'self-education,' it is our own will that has to be trained there seems to be an insuperable difficulty. How, it may be asked, is it possible before the will is formed to carry out a volition which aims at something so high as an improvement of the faculty? This difficulty is, however, less serious than it looks. An adequate motive may in this case be supplied by the workings of our own mind: it grows out of a comparison of the actual self with a possible ideal self. This situation is illustrated in all effort to alter the ruling disposition, that is, to improve the character. Here the supreme importance of attention as a factor in voluntary action acquires a new practical significance. As we have seen in dealing with the several forms of self-control, and more especially with the phenomena of moral effort, the special direction of attention to an idea serves to modify its feeling-value, and so its motive force. Education of will, in the sense of developing one's character, turns on this fact. If only a desire to be better exists we can ourselves contribute towards the improvement by furthering from time to time the reinstatement of the appropriate motives so as to fix them as dominant forces.

All education of will is further a practical application of the laws of habit. If the teacher had to go on using all the force which he is required to use at the outset, or if the self-educator had to continue making the severe initial effort, progress would be impossible. The very idea of developing will and of forming character is based on the assumption that impulse and motive can by a methodical repetition of action be set in definite lines.

REFERENCES FOR READING.

On the more complex processes of volition and their relation to primitive action, see Bain, *Mental and Moral Science*, book iv. chaps. iii.-vii., James, *Psychology*, chap. xxvi. p. 528 ff., Höffding, *The Outlines of Psychology*, vii. B. Moral habit and character are specially dealt with by Carpenter, *Mental Physiology*, chap. vii The educational aspect of character has recently been handled by Guyau, *Education and Heredity*, part i.

CHAPTER XVI.

CONCRETE MENTAL DEVELOPMENT: INDIVIDUALITY.

Unity of Mental Development. The three movements of the mental life just traced, *viz.*, that of intellectual, affective, and conative growth, though capable by an artifice of abstraction of being traced out separately, are, as already hinted, intimately conjoined. A word or two in addition to what has been said above on this organic unity of our conscious experience may fittingly close our detailed examination of psychical processes.

We have found each of the three psychical factors, the cognitive or presentative, the affective, and the conative, as a primitive element, asserting itself to some extent as a separate functional tendency. The baby in the first week of life manifests the rudiment of intellectual activity, of feeling, and of motor impulse. The actual concrete form of the mental life is developed by the conjunction and ever-varied interaction of these psychical forces or tendencies. Without attempting to follow out the endless variety of product thus resulting, we may just refer to the two more important modes of combination or interaction: (*a*) that of intellectual activity with feeling, and (*b*) that of intellectual activity and feeling with conation.

(*a*) **Interactions of Intellect and Feeling: Interests.** That the development of feeling and of ideation are parts of one total process of mental growth has been already implied. The supposition of an intellectual life without any tinge of feeling, or of an emotional life unsupported by presentations, is an error. Our 'horde' of ideas, *e.g.*, that corresponding to our social experience, our professional pursuits, our art-studies, etc., is vitalised and to a

large extent penetrated and cemented by feeling. On the other hand, even the most violent passion involves an ideational process.

It is evident that we have here to do with a growth, *pari passu*, of two concurrent factors, each of which is affected by, and in its turn affects, the other. This is seen in the formation of those fixed presentative-affective groups with their attractive and repellent tendencies which we call *interests*. A boy acquires a strong keen interest, say in cricket, by acquiring knowledge of the game, its practice, and its rules, its history, its prominent heroes, and the like. This knowledge, again, is in its turn the outcome of certain pleasurable sensibilities, as love of physical exercise and social likings.

(*b*) **Interactions of Intellect and Feeling with Conation.** In dealing with the development of conation it was pointed out that this is throughout conditioned by the growth of ideation and of emotion. This dependence is clearly recognised in the common order of psychological exposition. A developed will is a product of active impulse enriched by additions of the stimulative element of feeling and the illuminative element of intellection.

Here, too, however, we have to do with a *reciprocal* action. Not only does the growth of feeling and of ideation thus minister to the normal expansion and consolidation of activity, but the production of a firm and enlightened type of volition reacts on feeling and thought. As pointed out in our account of the processes of self-control, the cultivation of emotion and of intellect alike includes a regulative volitional factor. The intellectual man is *ipso facto* the volitional man so far at least as the voluntary direction of the attention is concerned. Similarly, though less manifestly, does the highest realisation of the emotional nature depend on a volitional factor. Thus the epicurean who thoughtfully plans out his life so as to get the greatest variety of refined pleasure with the least possible amount of disagreeable drawback must have, not only some of the range and precision of intellectual view of the man of science and of the philosopher, but some of the indomitable

firmness of will and completeness of self-control of the ascetic himself.

It is thus evident that in spite of the fact that intellection, feeling, and active impulse are distinct psychical forces or tendencies, and that in their most energetic forms they assume the aspect of hostile or incompatible tendencies, they are organically implicated, so that there can be no normal and complete development of one without a concurrent and correspondent development of the others.

Typical and Individual Development. The complete harmonious development of mind just described, which involves a proportionate fulness of each of the constituent phases, and of each constituent in its several distinguishable varieties, is an ideal never perfectly realised. The actual concrete minds which we know all exhibit deviations from this typical scheme in one or another direction. Thus we find now a special intensity of feeling, an emotional excitability or passionateness, which is in excess of the powers of thought and of volition. In like manner we see men who are intellectually great but are lacking in a commensurate power of general volitional control; and others who to much energy in action and firmness of purpose join intellectual narrowness, and emotional dulness.

It follows from what was said in the preceding section that such one-sided development always involves a limitation also in the power that seems to be predominant. Thus so-called emotional persons will commonly be found in reality to feel strongly and quickly in certain directions only, as *amour propre* or a narrow and intense form of sympathy (*e.g.*, maternal compassion). This truth that one-sided development is also incomplete development *even on its one side* is of the greatest practical importance. In studying and dealing with men we require to know not merely on which side (intellect, volition or feeling) they are strong and weak respectively, but also in what particular directions of intellectual activity, and so forth, they are so.

The problem of determining and formulating the several modes of variation of mental development is a subject which has

hardly begun to be seriously grappled with. The innumerable varieties of individual character among civilised men appear indeed to defy any attempt at scientific analysis and classification In a work on general psychology like the present this problem can only be touched upon.

Varieties of Mind. If we regard the human beings we know, we are struck at once by the fact of numerous diversities. Each individual has a mind which, while it is an example of the common type of mental structure, is at the same time something unique, a peculiar group of psychical or, if we include the correlative nervous factor, psycho-physical tendencies.

A little inspection shows us that these variations are measurable in different ways. Thus, to begin with an obvious distinction, we may arrange men according to their place in *the scale of mind.* In any community there is a scale of mental power and of correlative brain-power, from arrested development and imbecility up to the highest manifestations in the few great minds. This mode of estimating minds is the one commonly employed by the anthropologist in determining the place of particular races in the evolutional scale.

In the second place, we may distinguish and classify minds according to the relative force or prominence of the several psycho-physical tendencies which constitute mind. In this way, for example, we get the contrasts of temperament and character which appear in general between the two sexes, and among different races at the same level of culture, and among individual members of the same race and community. These differences may be roughly marked off from the first as differences of grouping or of *mental pattern.*

These variations may be more general or more special and individual. As an example of the former, we have the preponderance of the emotional over the intellectual, and so forth (in the sense already defined). The more special individualising differences are illustrated by the particular bent of intellectual activity manifested, the relative strength of the several emotional susceptibilities and aims. As implied above, there is the special intel-

lectual aptitude for this or that group of ideas, and a corresponding ineptitude in other directions. Thus, as already pointed out, there are men observant and retentive in respect of certain classes of sense-impressions, *e.g.*, visual presentations, and, more narrowly, of one group of these, as colours. Not only so, we see a further limitation of the special intellectual bent connected with a peculiar interest in a group of concrete objects, as is illustrated in the special intelligence which some persons manifest with reference to human faces, and generally what may be called personality, a specialised mode of intelligence found in many women.

These differences in combination of psychical elements or mental pattern doubtless have their nervous correlatives. Just as evolutional height is correlated with the degree of cerebral development as a whole, so psychical pattern presumably corresponds with the particular structural configuration, and the *relative* development of the several parts of the brain. The later researches in cerebral anatomy and physiology enable us to perceive, to some extent, wherein such differences of cerebral configuration consist. At the same time, our knowledge does not as yet enable us to determine these correlations with any degree of certainty (see above, p. 26).

Scientific View of Individuality: Measurement of Psychical Capacity. It follows from the above definition of individual variation, as a peculiar combination or mode of grouping of elements, that a scientific treatment of the problem must set out with the elementary or fundamental psycho-physical constituents. These are the tissue out of which the mental organs which we call faculties are formed. Every observable difference of individual minds ought to be susceptible of being exhibited as a result of particular groupings of these elements in certain ratios of strength. In order to solve this problem two conditions have to be satisfied. First of all we must know what is elementary or fundamental. In the second place we must be able to measure these elementary forces with something approaching to scientific exactness.

With respect to the first of these conditions, it may be confi-

dently said that our psychological analysis, aided by the physiology of the nervous system, enables us to some extent to solve the problem. Thus we have seen that all intellectual ability is in general determined by the perfection of the senses together with the closely conjoined intellectual function known as discrimination. Fineness, or delicacy of discriminative sensibility, is thus one fundamental element of intellectuality. Further, we have learnt that power of attention, as illustrated in prolonged fixation, rapid transition from object to object and grasp or comprehensiveness, assimilation or readiness in detecting similarities, as also retentiveness and associative power, are fundamental constituents of intelligence. In the case of feeling, again, we have traced down all emotional susceptibility to certain organically determined sensibilities to pleasure and pain; and similarly we have found in active impulse under its double form, attention and (psychical) movement, the fundamental element in conation.

If now we turn to the second condition of the problem and ask how far these elementary psychical capacities are measurable, we are confronted with certain obvious difficulties. Our psychical states are not quantitatively comparable in the way in which material magnitudes are so. We cannot, for example, say that one sensation has precisely three times the intensity of another. Yet, as we have seen, the new science of psycho-physics, or, to use a more exact expression, psychometry, has made a promising beginning in carrying out certain simple quantitative determinations.

Psychical phenomena may be said to exhibit three aspects under which they admit of quantitative comparison or measurement. (*a*) Of these the first and most obvious is Intensity. The various modes of determining this, in the case of the simpler psychical phenomena, sensations, have been dealt with above. It is evident that these methods of measurement are fitted to determine individual variations. Thus individuals can be compared with some exactness in respect both of absolute and discriminative sensibility to intensity of light, sound, and so forth. It is probable that by help of a suitable psycho-physical apparatus other psychical

phenomena, as feeling and conative effort, may be similarly measured in respect of intensity.

(*b*) Next to intensity we have Duration, or time-magnitude. All psychical phenomena have this dimension, and, as we have seen, important experimental contributions have been made to the measurement of this quantitative aspect of mind. More particularly, the inquiries into Reaction-time (see p. 86) have led to some amount of exact knowledge of the time occupied, not only by transmission of nervous excitation from periphery to centre, and conversely, but by the central psycho-physical process itself. Here, too, important individual differences have been noted, and this line of inquiry promises to be a fruitful instrument of a comparative measurement of psychical processes. Thus the power of adjustment to sensations (attention), of associative suggestion, and even of judgment and choice, may be measured in the case of any individual by means of the experiments already devised, that is to say, by comparing the duration of the process in the case of different persons, and estimating the particular psychical power involved as inversely proportional to this.

(*c*) Lastly, a bare reference may be made to Extensity, and what is only another aspect of this, Complexity. The discrimination of extensive magnitudes may be estimated in the same way as that of intensive. As pointed out above, individuals differ greatly in respect of the delicacy of the tactual discrimination of points, and these differences of local aspect can be numerically determined. Another direction of psychical measurement in which range or complexity comes in is what has been called "span of prehension" or the number of visible objects clearly distinguishable by a momentary glance. It is highly probable that here, too, important inequalities would be discoverable among different persons. Comparative measurement of this power might be supplemented by that of the power of grasping a succession of sense-impressions, as those of sound. Some interesting experiments go to show that this capability varies pretty uniformly with age and degree of intelligence, and might with advantage be taken as at

least a rough criterion in the estimation of children's mental power as a whole.

Causes of Individual Variation. If mental development in its common typical form is a product of two factors, congenital power, and exercise of function or what we commonly call experience, we may infer that all variations depend on differences in these two factors. That is to say, every degree of general superiority or inferiority of mind, and every special modification of mental pattern, arise from certain differences in the original psycho-physical constitution or in the life-experience of the individual.

That the primitive psycho-physical constitution is variable from individual to individual is a fact of common observation. Just as a glance tells us that no two human faces, even at the age of infancy, are perfectly similar, so we have reason to suppose that no two human brains, and consequently no two sums of mental capacity, are alike. The most careful observers of infants are able to point to important psycho physical differences, *e.g.*, in the effect of sense-impressions in calling forth the reaction of attention and motor phenomena generally, which appear in the first week of life.

These congenital variations are by some ascribed to ever-varying resultants of the forces of heredity. Thus a child is a new and unique product because it represents a new combination of ancestral influences. According to this view, individuation is the result of a continually changing mixture of hereditary tendencies. It cannot, however, be said that the theory of heredity has as yet succeeded in making this mode of explaining native individuality or idiosyncrasy perfectly clear. Congenital variations probably involve the action of other causes which are as yet unknown.

Whatever the nature and the extent of these congenital organic foundations of individuality, they have to be supplemented by our second factor, *viz.*, functional exercise. The biologist's conception of development is that of a process of interaction between organism and environment. As we have seen, mental growth is determined by the presence of suitable stimuli or excitants in the environment. These external conditions vary considerably

from individual to individual. Thus no two children, not even members of the same family, come under precisely similar physical conditions, as temperature, nutrition, excitation of movement, etc. The succession of sense-stimuli, with their correspondent motor reactions, making up the life-experience of an infant, is a different one in every case. Still more evidently is the human environment a variable one. Even twin members of a family have an unlike social *milieu* in so far as the parents and others feel and behave differently towards them. This modifying action of the human environment is strikingly illustrated in the marvellous results attained by the best systems of individual education. Laura Bridgman, after her early loss of sight and hearing, would have remained an imbecile but for Dr. Howe's devotion of his time and energies to the problem of educating the little unfortunate.

We may say, then, that individual development is the action of what Mr. Galton has happily called "nurture" upon "nature". The possibilities are no doubt organically determined from the first. A child never becomes that for which he has not a native aptitude. Yet, while the broad limits are thus fixed by nature or congenital organisation, the determination of what particular original tendencies shall be developed falls to the environment. This may be said to work *selectively*, strengthening and maturing certain among the congenital tendencies rather than others.

Extreme Variations: (*a*) Variations of Height, Genius. With this general idea of psychical variation to guide us, we may just glance at some of the more remarkable cases of individuality. Here we shall best begin with the extremes of evolutional height. At the one extreme we have arrested development and imbecility, a phenomenon which is commonly looked upon as abnormal and pathological. At the other extreme we meet with what is called the great mind. A word or two may be added on this interesting example of variation.

Men and women of great and remarkable minds, or, as they are popularly described, of genius, are known to have an exceptional cerebral organisation. In many cases, at least, this

cerebral development is out of proportion to the total organic development. We may thus, from a biological point of view, roughly describe a great man as one in whom the cerebral organisation reaches the highest known point of development.

Statistical research goes to show that men of this preternatural mental power manifest their superiority at an early stage of development. In other words, they are, as a rule, precocious. The outward expansive tension of the congenital impulse is illustrated in the well-known fact that many a distinguished artist and man of science has pushed his way to self-realisation independently of, and in opposition to, external circumstances. Thus the greatest minds show in the most marked way the selective determination of the (individual) environment by the organism. It may be added that, according to the inquiries of Mr. Galton, these mental giants go on developing through an exceptionally long period.

As hinted above, a great mind is more than a preternaturally strong intellect. This is obvious in the case of those to whom we are wont to ascribe genius, *viz.*, the creators of art and literature. The poet and the musician are determined quite as much by the extraordinary acuteness and depth of their feeling as by superiority of the specifically intellectual functions. Not only so, as we know on the testimony of more than one great man, *effective* greatness, that is, power which realises itself in production, involves sovereign strength of will in the shape of strenuous ambition and masterful concentration.

Extraordinary mental force tends to be developed at the expense of the other organic powers. Thus the man of great intellect or genius has frequently been characterised by marked moral failings, weakness of will in the control of the passions, and so forth. Indeed, this fact, taken along with the liability to physical disorder, which is often noticeable, has led certain writers to go so far as to regard the organic basis of all genius as a *neurosis* or abnormal deviation from the healthy type of nervous organisation.

(*b*) **Extreme of Normal Pattern: Eccentricity of Character.** We may now pass to the other kind of psychological extreme, *viz.*, that mode of structural variation of mental

character which departs most widely from the typical form All individuality is, as we have seen, a modification of the common ideal type in particular directions. There are, however, certain limits to what we regard as the normal extreme of these variations Where the individual shows such a preponderance of particular impulses and tendencies as to give rise to the appearance of defectiveness in what we consider the common features of a human mind, we are apt to characterise it as eccentricity Thus extreme concentration even on a worthy aim, as art or science, when it is accompanied by apparent neglect of so vital a matter as the bodily health, is wont to be viewed with suspicion As is well known, a number of great men, for example, Newton, Beethoven, have been marked by such peculiarities, whence the amount of literature that has occupied itself with the "eccentricities of genius"

In these extremes of eccentricity we have, it is evident, to do with phenomena that lie on the boundary line between the normal and the abnormal. Our exposition of mental development has occupied itself with the normal type: yet, in order to give an adequate idea of mind in its concrete manifestations, we must make a brief reference to abnormal variations from this type

The Normal and the Abnormal Mind. The distinction of normal and abnormal, and the closely related distinction of healthy or sane and pathological or insane, are psychological in so far as they point to actual differences of psychical or, to speak more completely, psycho-physical phenomena. An abnormal mind is one, the particular organic conditions and manifestations of which deviate by a considerable and easily recognisable interval from the typical plan of psycho-physical configuration. An instance may be found in an extreme doting affection for certain animals, amounting to self-denying devotion, and a correlative indifference to human objects of benevolence.

At the same time, it is evident that we have to do here with more than a purely psychological or matter-of-fact distinction. The significance of the contrast is only understood when we regard it as teleological and practical. The normal is adjustment of organism to environment, the abnormal is mal-adjustment

Our practical instincts lead us to mark off sharply those amounts of individual deviation from the standard type which render the subject incapable, irresponsible for his actions, a burden if not also a menace to society.

A glance at some of the familiar examples of mental obliquity or unsoundness will at once show this to be so. Thus a disturbance of that fundamental reaction of mind to environment which we call perception, leading to individual "illusions of sense," is one of the indications of abnormality most plainly recognised. Similarly where the realities of the surroundings are misapprehended through the rise of *bizarre* delusions of the imagination. In like manner, perversions of the feelings, such as transformations of what we call 'natural' affection into its opposite, also of the active impulses, as in the direction of the volitional energies to what is whimsical and commonly regarded as valueless, are popularly viewed as manifestations of mental unsoundness.

Abnormal Tendencies in Normal Life. As already observed, the normal typical mind is a scientific fiction never fully realised. The truth of this proposition is strikingly illustrated in the fact that in the case of all men there are discoverable, more or less distinctly, tendencies which point in the direction of the abnormal. Thus, if we look at the phenomena of sense-perception, we see that there is in the case of no man an exact correspondence throughout between mental percepts and external realities. There are common tendencies to sense-illusion due to unalterable conditions of our sensibility, as in the effect of colour-contrast, or to the overpowering effects of habit, as in the partial deceptions of the mirror, and so forth. Since, however, these errors of sense-perception are of minimal extent and importance, and are, moreover, connected with what on the whole is a normal psycho-physical condition, they are with reason disregarded.[1]

[1] See my volume *Illusions*, chaps. iii.-v. I have there tried to show that what we may call normal, that is, common as distinguished from individual sense-illusion, is analogous to the occasional error arising from the deductive application of a general principle which is only approximately true.

The phenomenon of occasional abnormality manifests itself more plainly in those disturbances of sense-perception which arise from temporary organic conditions. Thus the tendency to Illusions of the Senses, that is, misinterpretation of sense-impressions under mental excitement and a too powerful imaginative anticipation, as when a timid and superstitious person mistakes an object indistinctly seen in the dark for a ghost or hobgoblin, is clearly a case of mal-adjustment, and of a kind of mal-adjustment which leads to wasteful and hurtful action. Still more clearly is there the phenomenon of occasional abnormality where through a disturbance of either peripheral or central nervous structure the subject 'reacts' in the form of a sensation where *no* external stimulus is at work. Of these subjective counterfeits of objectively excited sensations, again, the most distinctly abnormal, because the most significant of hurtful organic disturbance, are what are known as Hallucinations, that is, pseudo-perceptions of external objects where none exist, as when a person imagines he hears another's voice though no external sound is present.[1]

Dreams as Abnormal Phenomena. Among the abnormal or *quasi*-abnormal incidents of what on the whole is normal life are the phenomena of dreams. The phantasms of sleep are abnormal inasmuch as they assume the character of sense-phenomena which do not correspond with the real external world of the moment, *viz.*, illusions and hallucinations. As such they are, besides, deviations of the action of the individual from the common type of action. A man's dream-experiences are an isolated life. Dreaming, moreover, is evidently connected with a temporary disturbance of the ordinary cerebral conditions, *viz.*, that underlying the state of sleep, and probably resolvable into an altered condition of the intra-cranial circulation.

At the same time we do not regard the dreams of ordinary

[1] On the distinction of Illusion and Hallucination see my volume *Illusions*, p. 11 and p. 111 and following. It has been ascertained by the statistical researches of E. Gurney that about one out of every ten healthy persons has at some time been the subject of a hallucination.

sleep as abnormal in the sense in which hallucinations in the waking state are so. This is due to the fact that sleep is a regular and periodic incident of normal life, and one, moreover, which is known to benefit the organism by promoting nutrition and recuperation of the several structures. So far as dreaming is connected with and a result of such healthy and beneficial sleep it may be viewed as normal.

How far this is really so is a matter of dispute. It is a question much debated by physiologists and metaphysicians whether all natural sleep is accompanied by a faint remnant of consciousness, or whether the healthiest sleep is not a condition of perfect dreamlessness. Supposing the latter to be the case, dreaming would, of course, assume the aspect of a slightly abnormal phenomenon. However this be, for practical purposes ordinary dreaming may be regarded as harmless, since it involves merely a temporary confusion of the presentative order, together with the connected ideas and feelings, and does not lead to *wrong motor reactions*. Where, however, as in the case of the sleep-walker, such reactions are forthcoming the abnormality of the psychical state forces itself on our attention [1]

Artificial Sleep: The Hypnotic State. Closely related to the phenomena of natural sleep is that artificially induced state which has been variously described as the Magnetic, the Mesmeric, and, more recently, the Hypnotic trance. This, which has of late been made the subject of a vast amount of experimental research, is a particular cerebro psychical condition inducible in a certain number of persons having the requisite susceptibility by various means, as by getting the subject to fix his eyes steadily on a bright button held near the forehead, by stroking the skin of the head, face, etc. The result of these operations is a state of sleep in which the subject is, as in natural sleep, though much more profoundly, insensible to sense-stimuli generally, but continues to react to stimuli coming from the operator, as in following out a command, however absurd and even hurtful.

The mental phenomena observable in the hypnotic state are highly curious and of great value to the student of normal

[1] For a fuller account of the phenomena of dreams, see my volume *Illusions*, chap. vii.

psychoses. They are, however, too complicated, and as yet too imperfectly understood, for one to attempt a full description of them in a work on general psychology. A word or two on some of the more important aspects of the state must suffice.

As the name hypnotism suggests, the state has a close analogy to that of normal sleep. Thus there is a rupture with, and forgetfulness of, waking experience, and so an interruption of the current of normal self-consciousness. As in natural sleep, so here there is a tendency to a narrowed intensified imaginative consciousness or "mono-ideism." Since the mass of external sense stimuli remains inoperative the subject is wholly possessed by the particular images suggested. Again, as in much of our dreaming, the emotions are roused to a preternatural degree of intensity.

At the same time, the hypnotic state contrasts with that of normal sleep. This contrast already shows itself, as pointed out above, in the fact that the hypnotic patient remains sensibly awake and particularly alert to one region of impression, *viz.*, *that answering to the actions of the operator*. Among other points of difference one of the most important is the circumstance that hypnosis includes as one of its main manifestations the action of the voluntary muscles. The hypnotised subject does things, *e.g.*, drinks a nauseous draught, in obedience to the suggestion of the operator that it is pleasant. This activity of the motor apparatus gives greater volume, as also greater clearness of manifestation, to the emotions aroused in the state, and, what is more important, renders the actions called forth organic reactions to environment in the complete sense. It is under this aspect that they show themselves most distinctly *abnormal*, and akin to the actions of a madman.

Under another of its aspects the hypnotic state contrasts with normal sleep, and has a closer analogy to that of alternating consciousness or *double personality* which is known to have been induced in a number of cases by certain forms of injury to the brain. Our successive lapses into the dream world do not constitute one connected experience, but a series of disconnected ones. In the case of the hypnotised subject, however, there is the curious

phenomenon of *the recollection during a trance of what happened in preceding trances*, so that the successive trances are woven in a measure into a second experience or mental life with its memory of the past and its sense of continuity.

One word must be added on what are perhaps the most remarkable phenomena of the hypnotic state, *viz*, the alterations of sensibility. Loss of sensation (anæsthesia) and abnormal intensification of sensibility (hyper-æsthesia) are both producible in the hypnotised subject. Here, again, we have phenomena analogous to certain familiar incidents of pathological disturbance. The psychological significance of these modifications in the hypnotic trance is that they are brought about by the central psycho-physical agencies of *suggestion*. The same line of remark applies to the striking phenomena of rigidity of body and paralysis of muscle which are well-known accompaniments of the state.

Transition to Pathological Psychoses. The psychical phenomena just considered constitute an intermediate region between healthy or sane and morbid or insane psychosis. In this last we have to do with a more or less permanent functional and structural disorder of the organs of mind, due either to organic predisposition (inheritance) or to injury.

Such loss of normal completeness and equilibrium of mind may be induced by *peripheral* injuries, as in the case of the destruction of a sense, the loss of a limb. These peripheral injuries are, however, as we know, compensated by those new psycho-physical co-ordinations which a healthy brain is capable of carrying out. Thus, not only in the case of those born blind, but even of a child with the sense-apparatus so seriously impaired as Laura Bridgman, the higher development of the remaining senses, more particularly active touch, has served to secure the required sensuous basis for a fairly complete development of mind.[1]

It is far otherwise where the *central* structures are impaired. In this case we see a real process of mental disorganisation.

[1] For a full and interesting account of the blind deaf-mute, Laura Bridgman, and the marvellous results of her careful education, see Professor Stanley Hall's article in *Mind*, iv. p. 149 f.

Psychical factors which are essential to the normal pattern of consciousness are lost, other constituents acquire abnormal strength and preponderance, and the whole arrangement is distinctly a maladjustment to the circumstances of the environment.

These disturbances, again, may be comparatively restricted, involving local degeneration only, or, on the other hand, extended and deep-reaching, involving a more general and profound disorder of the central organs. As examples of the former we have specialised forms of amnesia or partial disintegration of memory, such as loss of a particular group of words, *e.g.*, proper names, or word-deafness, *i.e.*, loss of the ideational connexions by which we apprehend or understand words.

The more extended kind of disorder assumes a variety of forms which the pathologist seeks to classify. This is not the place to give an account of such brain-troubles. It may be enough to point out that the effect of mental disease is in general to substitute for the complex balanced system of psychical forces which we have in health, a comparatively simple state of things in which certain tendencies grow abnormally strong and predominant through the suppression of others. More particularly, the higher and latest acquired forms of psychosis, regulative processes of ideation, and self-control generally, tend to be dissolved, leaving the earlier and more instinctive tendencies uncontrolled. Thus through the weakening of the regulative volitional factor the patient is unable to control his ideas, and his intelligence is wrecked; or he becomes a prey to unregulated emotion, as where overweening conceit, timidity, or animosity becomes predominant, and helps to maintain corresponding mental illusions, *e.g.*, that the patient is an emperor, that his friends are bent on destroying him.

In this way, by showing us how psychical phenomena are affected when certain conditions are altered, the study of these morbid psychical states throws a valuable light on the conditions of normal mental processes. From it we may learn practical lessons, too, as the importance of maintaining that equipoise of function on which mental health depends; the dangers of all one-sidedness of mental

development, and especially of too narrow a concentration of mind on a particular group of ideas, unrelieved by anything in the shape of distraction and recreative activity; and the unhealthy tendency that lurks in all excessive isolation from our kind, with its self-engrossment, or excess of "subject-consciousness," its culture of eccentricity, and its disregard of the wholesome and corrective influence of others' opinions and sentiments.

SUPPLEMENTARY NOTE.

PSYCHOLOGY AND PHILOSOPHY OF MIND.

MIND AND BODY.

In bringing this account of the phenomena of mind to a close we may revert for a moment to the metaphysical question, *viz.*, as to what mind is in itself over and above the group of phenomena in which it is supposed to manifest itself. As already pointed out, this problem is best considered *after* an examination of the observable psychical processes, and seems indeed to grow out of this. To this it may be added that the practical importance of the closely connected question of the immortality of the soul has commonly led psychologists to point out what they consider the bearing of the psychological facts on the metaphysical problem. We may accordingly glance back on our results in order to see whether they are fitted to throw any light on this much discussed and deeply interesting question.

The bearings of our scientific or "empirical" psychology on these problems may be briefly indicated as follows: (1) What view does a consideration of the phenomena of mind lead us to entertain respecting the inmost nature and ultimate sources of mental activity? More particularly, does it lead us to the hypothesis of a spiritual substance or soul, distinct from, and independent of material things? (2) What does a thorough-going study of the physiological concomitants of mental phenomena lead us to regard as the real relation between mind and body? And how is this relation to be interpreted from a philosophical point of view?

In the history of philosophy we find that these different lines of inquiry have been pursued together. The discussion as to what mind is in itself must, it is evident, embrace that of its relation to its foreign companion, a material organism. Hence in tracing out the metaphysical bearings of our psychological study on the problem of soul we may most conveniently deal with the interpretation of what modern psychology, aided by physiology, tells us respecting the relation between mental and bodily phenomena.

Here it is at once evident that we have to do with a problem partly similar, partly dissimilar to that 'epistemological' problem already touched on in connexion with the philosophical treatment of cognition. In dealing with

mind and body in their temporal juxtaposition we are not primarily concerned with the former as *subject* and the latter as *object* of cognition. At the same time, the epistemological and the metaphysical question are closely connected; for in conceiving of the body as a being or substance, we are led on to ask in what sense this material thing can have any detached or absolute existence apart from the mind which knows it.[1]

If now we consider the conclusions reached by an examination of the concomitant phenomenal processes, psychical and neural, we find, in the first place, that it in no way justifies the reduction of the former to terms of the latter, *viz.*, modes of movement of material particles. The phenomena of consciousness are *sui generis*. Thus, if we take the psychical elements, sensations, we discover no affinity between a taste or a sound and the accompanying series of molecular movements. The same holds good *a fortiori* of the higher psychoses, as ideas, the emotion of love, and so forth. We have thus in the evolution of consciousness a succession of phenomena altogether disparate from material or physical phenomena.

On the other hand, we have found that this unique series of events is correlated with another and disparate series, *viz.*, the molecular movements in particular portions of the nervous system. This correlation is before all else a concomitance in time, that is, a synchronising of two series of events. The fact of this concomitance has been established with some degree of exactness in the case of the more elementary psychical phenomena, and though it is by no means fully proved in that of the more complex processes, *e.g.*, imaginative invention, moral choice, it is presumable that it holds good throughout.

Again, these two series, the psychical and the physical, not only run on together in time but exhibit certain correspondences in their respective variations. Thus, as we have seen, differences in intensity, extent, and complexity in our psychical states answer to similar differences in the nervous processes (see p. 27). On the other hand, qualitative psychical differences, though probably correlated with differences in the neural concomitant, are not correlated with *homologous* differences. That is to say, the difference between a colour and a tone, or two colours, has no analogy to a difference of form in the mode of nervous excitation. A like remark applies, too, to the processes by which psychical elements are organically combined and transformed into higher products. Discrimination, assimilation, and association, though presumably having their neural conditions, cannot be supposed to have conditions resembling themselves. There seems to be nothing in what is known or assumed regarding the nervous process

[1] On the distinction between metaphysic (or ontology) as theory of being, and philosophy as theory of knowledge, see Prof. Seth's article "Philosophy," in the *Encyclop. Britannica.*

underlying a consciousness of difference that is analogous to this peculiar mode of psychical activity

Coming now to the exact nature of the temporal concomitance, we find that the conscious series runs parallel only with an intermediate central portion of the neural circuit In the process of peripheral stimulation and the propagation of its effect to the centre, and in the transmission of a motor impulse from the brain to the muscles, we have a physiological process without any conscious concomitant. How are we to conceive of this partial parallelism? Does it point to any true causal relation between the psychical and the neural factor, or does it rather suggest a parallelism of two disconnected processes, as of two rivers flowing side by side?

These questions have not yet been satisfactorily answered by scientific methods. According to a common view, more especially among physiologists, we have to think of the chain of nervous events as complete and self-sufficient throughout. It follows from this supposition that there can be no causal action of consciousness upon the series of neural events, just because, in accordance with the principles of modern physical science, more particularly the law of the conservation of energy, every phase of a series of movements is fully accounted for by a knowledge of the preceding phases. This view looks upon the appearance of consciousness at a certain point in the physical succession as something collateral and apparently accidental This doctrine is known as that of Human Automatism, the doctrine that we are essentially nervous machines with a useless appendage of consciousness somehow added. The doctrine obviously fails to explain why consciousness should appear on the scene at all.

Opposed to this view, we have another which regards the psychical processes as at least as real as the physiological, having a reality which cannot, without setting at nought fundamental distinctions, be subsumed under, or even made subordinate to, physical action. This view is naturally the one to which students of psychology have on the whole inclined. It concedes that mental events are conditioned by nervous processes in the sense explained above, but it declines to regard the one as in any sense the outcome of the other. Some psychologists go further, and argue that a scientific examination of the facts goes to support the idea that consciousness in its turn stands in a causal relation to nervous action, since its intervention must be supposed to modify the form of the reaction. This efficiency of consciousness is especially maintained in the case of volitional acts

This slight sketch of the different scientific conceptions of the psycho-physical relation may suffice to show that we have here to do with a unique fact of our experience. We know of no analogous correlation by the help of which science is able to elucidate it.

The difficulties of the problem are further illustrated in the attempts of metaphysics to find in a theory of the ultimate nature of mind and of body an

explanation of the facts. The first and crudest of these theories is that known as Dualism, according to which mind and body are distinct independent beings having no real interaction, the appearance of such interaction being due to special interpositions of divine power. This theory offers, it is plain, no scientific, but only a theological or supernatural solution of the fact of concomitance. Hence it has not satisfied the thought of the modern world, which has endeavoured to transcend the duality of mind and body by help of a single uniting principle.

Such a unification may be attempted, first of all, in one of the two directions pointed out above, *viz.*, by resolving either of the two factors into the other. In this way we obtain the metaphysical conceptions known as Materialism and Spiritualism. The former attempts to reduce all substance to matter, and to view conscious mind as a product of this. This way of dealing with the connexion is open to the objections already pointed out, *viz.*, that consciousness is a reality wholly disparate from material processes, and cannot, therefore, be resolved into these. It is further open to the criticism that it makes that which is immediately known (our mental states) subordinate to that which is only indirectly or inferentially known (external things); also to the philosophic objection of idealism, that a material entity existing *per se* out of relation to a thinking mind is an absurdity.

The other doctrine, Spiritualism, escapes the objections just urged. By conceiving of mind as the one real substance, and viewing the material body as in its inmost nature spiritual also, it simplifies the metaphysical question. In its turn, however, it hardly succeeds in meeting the difficulty of the juxtaposition of the two in the case of at least certain of the higher organisms.

This leads us to the latest and most popular attempt to grapple with the problem, *viz.*, that now known as Monism. According to this theory, both the mental and the material are real, or self-existent, but are not independent realities. Consciousness and the fundamental property of material things, extension, are conjoint attributes of one and the same substance. Thus the ultimate reality or fundamental substance is neither spiritual alone, nor material alone, but both. The parallelism of the two chains of events in the case of certain organisms points to the conclusion that the two attributes are inseparable, and only different aspects of the same reality, like the convex and the concave side of a curve. This doctrine plainly gets rid of the difficulties which beset the apparent interaction of mind and body. There is no interaction as the Dualist would conceive of this, but merely a parallelism due to the uniform co-manifestation of the two conjoined attributes. It may be added that it escapes the difficulty lurking in dualism and materialism, if not also in spiritualism, *viz.*, that of the apparent limitation of consciousness to particular modes of material action, *viz.*, functional movements of central nervous organs. According to monism,

the parallelism runs through all things, inert as well as living matter, so that we have to conceive of every particle of matter as having its *quasi*-mental aspect. In this extension of the realm of mind, however, to material things generally, monism separates itself widely from the point of view of our common psychology, which conceives of mind and consciousness as co-extensive, and correlates this exclusively with particular collocations and formations of material particles.[1]

[1] For an account of the several theories of body and mind in their connexion with psycho-physical facts, see Bain, *Mind and Body*, chap. vii.; and Höffding, *Psychology*, ii

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